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REPORT

ON THE

SCIENTIFIC RESULTS

OF THE

VOYAGE OF S.Y. "SCOTIA"

SCOTTISH NATIONAL ANTARCTIC EXPEDITION.

REPORT

ON THE

SCIENTIFIC RESULTS

OF THE

VOYAGE OF S.Y. "SCOTIA"

DURING THE YEARS 1902, 1903, AND 1904,

UNDER THE LEADERSHIP OF

WILLIAM S. BRUCE,

LL.D., F.R.S.E.

Volume VII.—ZOOLOGY.

PARTS I.–XIII.—INVERTEBRATES, by M. le Professeur EMILE TOPSENT; J. H. KOEPPERN; HELEN L. M. PIXELL, B.Sc., F.Z.S.; F. F. LAIDLAW, M.A., F.Z.S.; Professor J. STANLEY GARDINER, M.A., F.R.S.; F. GORDON PEARCEY; WALTER W. TATTERSALL, D.Sc.; L. N. G. RAMSAY, M.A., B.Sc.; A. PRINGLE JAMESON, B.Sc.; Professor OSKAR CARLGREN; T. J. EVANS, M.A. (Oxon.); Professor J. H. ASHWORTH, D.Sc., F.R.S.

With Fifteen Plates and Twenty-three Text-Figures.

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EDITORIAL NOTE.

THE present volume constitutes the fifth series of papers on the Zoological Results of the Scottish National Antarctic Expedition, and is the third volume dealing with the Invertebrate life of Antarctic and adjacent seas. It contains thirteen papers ranging through most of the great groups of invertebrate animals, from Protozoa to Crustacea and Mollusca, and to its formation have gone the researches of distinguished scientists, not only in Scotland and England, but in France and Sweden as well. To these contributors the thanks of the Editor and of the scientific world are due, the more so since the world at large has not yet recognised that the labourer in scientific fields is worthy of his hire, and since these contributions one and all are the fruit of labours of love.

The collections dealt with in the present papers have not only furnished many species new to science, but have afforded material from which considerable additions have been made to our knowledge of the structure and distribution of previously recorded forms, and upon which useful revisions of related forms have been based.

It is with regret that I have to record the death in action at Neuve-Chapelle, on 21st March 1915, of one of the contributors to this volume, Lieut. L. N. G. Ramsay, whose papers on Polychæts in the present and on ornithology in a previous volume gave promise of a bright career as a zoologist. To the war also must be attributed the delay in the issue of this volume of the Scientific Results of the *Scotia*, for the difficulties in the way of publication have been great, and have even now been circumvented only through the generosity of Sir Thomas Glen-Coats. To him, as to the Carnegie Trust for the Universities of Scotland, which assisted by contributing to the cost of the production of Plates and of Title-pages, the Editor offers his sincere thanks. Similar recognition is due also to the Councils of the Royal Society of Edinburgh and the Royal Physical Society for permission to make use of contributions to their publications, for with a single exception the papers in this volume have appeared in their *Transactions* and *Proceedings*; to the former in particular his gratitude is due, in that it bore the charges of the primary printing of the majority of the papers. To obviate all possibility of confusion in cases of reference, the original pagination of these papers is given at the foot of every page, and the date of first publication is stated in every case. Through an oversight in paging, pages 233 to 236, between two independent Parts of this volume, are non-existent. My cordial thanks are due to Dr R. N. Rudmose Brown and Dr J. Ritchie for their valuable assistance in the final arrangement of the volume.

WILLIAM S. BRUCE,
Editor.

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PART I.

SPONGES.

I.—THE SPONGES OF THE SCOTTISH NATIONAL ANTARCTIC EXPEDITION.

BY

EMILE TOPSENT.

Professor of Zoology in the University of Dijon.

(*WITH SIX PLATES.*)

Spongiaires de l'Expédition Antarctique Nationale Ecossaise. Par **Emile Topsent**, Professeur à l'Université de Dijon. *Présenté par le* Dr. W. S. BRUCE. (Avec six planches.)

(Read December 16, 1912. Revised MS. received December 24, 1912. Issued separately August 20, 1913.)

Au retour de sa belle campagne de 1902 à 1904 dans l'Antarctique, M. le Dr. WILLIAM S. BRUCE m'a fait l'honneur de m'offrir l'étude des Spongiaires recueillis à bord de la *Scotia*. Voici de quoi se compose cette collection qui, à certains égards, offre un intérêt considérable.

HEXACTINELLIDA.

I. S.O. HEXASTEROPHORA.

Famille EUPLECTELLIDÆ.

Malacosaccus pedunculatus, Topsent.
,, *coatsi*, Topsent.
Acœlocalyx brucei, Topsent.
Docosaccus ancoratus, Topsent.

Famille CAULOPHACIDÆ.

Caulophacus instabilis, Topsent.
,, *scotiæ*, Topsent.

Famille ROSSELLIDÆ.

Bathydorus levis, F. E. Schulze, var. *ciliatus*, Topsent.
Calycosoma validum, F. E. Schulze.

Famille COSCINOPORIDÆ.

Chonelasma sp.

II. S.O. AMPHIDISCOPHORA.

Famille HYALONEMATIDÆ.

Hyalonema sp.

(REPRINTED FROM THE TRANSACTIONS OF THE ROYAL SOCIETY OF EDINBURGH, VOL. XLIX., PP. 579–643.)

TETRACTINELLIDA.

S.O. CHORISTIDA.

Tribu *Astrophora.*

Famille Asterostreptidæ.

Pachastrella monilifera, O. Schmidt.
Pœcillastra incrustans, Sollas.
,, *compressa*, (Bow.) Soll., var. *parvistellata*, n. var.

MONAXONIDA.

I. S.O. HADROMERINA.

Famille Suberitidæ.

Pseudosuberites exalbicans, n. sp.

II. S.O. HALICHONDRINA.

Famille Axinellidæ.

Hymeniacidon fernandezi, Thiele.
Bubaris murrayi, n. sp.

Famille Pœciloscleridæ.

Sous-famille *Ectyoninæ.*

Raspaxilla phakellina, n. g., n. sp.
Dictyociona discreta, (Thiele), n. g.
Clathria toxipraedita, n. sp.
Stylostichon toxiferum, n. sp.
,, *nobile*, var. *patagonicum*, (Ridley et Dendy) Topsent.
Dendoryx nodaspera, n. sp.

Sous-famille *Myxillinæ.*

Myxilla spongiosa, Rdl. et D., var. *asigmata*, Topsent.
Lissodendoryx buchanani, n. sp.
Iophon pluricornis, Topsent.
,, *unicornis*, Topsent.

Iophon spatulatus, Kirkpatrick.
,, *flabello-digitatus*, Kirkpatrick.
Tedania murdochi, n. sp.
,, *charcoti*, Topsent.

Sous-famille *Mycalinæ*.

Mycale magellanica, (Ridley) Topsent.
,, *acerata*, Kirkpatrick.
,, *pellita*, n. sp.
Cladorhiza thomsoni, Topsent.
Homœodictya verrucosa, n. sp.
,, *setifera*, Topsent.
Desmacidon ? sp.

Famille Haplosclеridæ.

Gellius arcuarius, n. sp.
Toxochalina robusta, Rdl. et D.
Petrosia depellens, n. sp.
Reniera cylindrica, n. sp.
,, *dancoi*, Topsent.
,, sp.

Une autre liste des espèces, dressée par stations, aura l'avantage de faire connaître à la fois leur distribution géographique et bathymétrique et leurs associations.

Station 301.

13 mars 1903, 64° 48′ lat. S., 44° 26′ long. W.; 2485 brasses.

Docosaccus ancoratus.
Acalocalyx brucei.

Station 313.

18 mars 1903, 62° 10′ lat. S., 41° 20′ long. W.; 1775 brasses.

Caulophacus instabilis.
Calycosoma validum.

Station 325.

Avril–août 1903, Scotia Bay, Orcades du Sud, 60° 43′ 42″ lat. S., 44° 38′ 33″ long. W.; 9–10 brasses.

Iophon unicornis.
,, *pluricornis*.
,, *spatulatus*.
,, *flabello-digitatus*.

Mycale acerata.
Homœodictya setifera.
Gellius arcuarius.
Petrosia depellens.
Reniera cylindrica.
,, *dancoi.*
,, sp.

STATION 346.

1er décembre 1903, Banc de Burdwood, 54° 25′ lat. S., 57° 32′ long. W.; 56 brasses.

Rossellides roulées.
Raspaxilla phakellina.
Clathria toxipraedita.
Stylostichon nobile patagonicum.
Dendoryx nodaspera.
Lissodendoryx buchanani.
Tedania charcoti.
Mycale magellanica.
,, *pellita.*
Homœodictya verrucosa.
Desmacidon? sp.
Toxochalina robusta.

STATION 118.

1er février 1904, Port Stanley, Iles Falklands; 6 brasses.

Tedania murdochi.
Hymeniacidon fernandezi.

STATION 417.

18 mars 1904, 71° 22′ lat. S., 16° 34′ long. W.; 1410 brasses.

Malacosaccus pedunculatus.
,, *coatsi.*
Caulophacus scotiæ.
Chonelasma sp.
Hyalonema sp.
Myxilla spongiosa asigmata.

STATION 420.

21 mars 1904, 69° 33′ lat. S., 15° 19′ long. W.; 2620 brasses.

Bathydorus levis ciliatus.

STATION 461.

22 avril 1904, Ile Gough, 40° 20′ lat. S., 9° 56′ 30″ long. W. ; 100 brasses.

Pachastrella monilifera.
Poecillastra incrustans.
,, *compressa parvistellata.*
Pseudosuberites exalbicans.
Bubaris murrayi.
Dictyocione discreta.
Stylostichon toxiferum.

STATION 468.

29 avril 1904, 39° 48′ lat. S., 2° 33′ long. W. ; 2770 brasses.

Cladorhiza thomsoni.

HEXACTINELLIDA.

La récolte de la *Scotia* en Hexactinellides a été particulièrement riche. Ces Eponges abondent dans l'Antarctique et cela par des profondeurs même médiocres. Cette constatation est certainement, en matière de spongologie, le résultat le plus intéressant de l'exploration zoologique de cet océan, à laquelle plusieurs nations collaborent depuis une douzaine d'années. Je l'ai déduite, dès 1901 (26), de l'étude des Spongiaires recueillis par la *Belgica*, l'opposant, en réponse à l'hypothèse de la bipolarité des faunes, à la remarquable pénurie des mers arctiques en Hexactinellides.

Il y a surtout des *Rossellidæ*. Toutes les Hexactinellides rapportées par la *Discovery* et les deux tiers de celles obtenues par le *Gauss* appartiennent à cette famille, qui avait déjà fourni la part la plus importante de la collection de la *Belgica*. Le *Français* n'a rien trouvé qui mérite d'être cité, mais le *Pourquoi Pas?*, à en juger par un examen superficiel des matériaux qui m'ont été confiés, a réuni de Rossellides une nouvelle et copieuse collection.

En revanche, il est de grosses familles d'Hexactinellides dont les expéditions antarctiques ne nous ont presque rien appris : les *Euplectellidæ*, les *Caulophacidæ* et les *Hyalonematidæ*.

Cela tient à ce que ces Eponges font en général partie de la faune abyssale et que la plupart des campagnes scientifiques ont été dirigées dans des portions de l'Antarctique aux eaux peu profondes. La *Belgica* a opéré le long des terres de Graham et d'Alexandre I[er], par des profondeurs inférieures à 600 m. Le *Français* et le *Pourquoi Pas?* ont successivement exploré ces mêmes parages. La *Discovery*, le long de la Terre Victoria, a pris presque toutes ses Hexactinellides par moins de 500 m. (plusieurs même par moins de 100 m.), à l'exception d'une seule—une Rossellide quand même—recueillie par 914 m. de profondeur au large des Mts. Erebus et Terror. Le *Gauss*, enfin, dans le nord-west de sa station (66° 2′ 9″ lat. S., 89° 38′ long. E.), rencontra des

profondeurs de 2450 m. à 3397 m. qui lui fournirent un *Caulophacus*, *C. antarcticus* et un *Hyalonema*, *H. drygalskii*.

De toutes les expéditions, c'est celle de la *Scotia* qui, fouillant les eaux profondes entre les Orcades du Sud et la Terre de Coats, à l'entrée de la Mer de Weddell, a le plus contribué à faire connaître les Hexactinellides antarctiques de familles abyssales.

La *Scotia* a, comme le *Gauss*, outre quelques Rossellides de grands fonds, des genres *Bathydorus* et *Calycosoma*, obtenu un *Hyalonema*. Elle a aussi dragué deux *Caulophacus* nouveaux, dont l'un, *C. scotiæ* Topsent, de taille géante, atteint près d'un mètre de hauteur. Mais mieux, elle fut la seule à recueillir des *Euplectellidæ*.

Ce qu'elle en prit offre un intérêt d'autant plus grand qu'il s'agit d'*Euplectellinæ* et que, des quatre espèces qui figurent dans sa collection, deux se rattachent au genre *Malacosaccus*, fort rare et jusqu'à présent mal connu, tandis que les deux autres représentent chacune un genre nouveau, ce qui élève de 3 à 5 le nombre des genres de cette sous-famille.

Je n'ai inscrit sur la liste générale des Hexactinellides de la *Scotia* (p. 7) que celles dont il m'a été possible de reconnaître au moins le genre : un *Hyalonema* et un *Chonelasma* n'étaient pas déterminables comme espèces et ne pouvaient servir de types à des espèces nouvelles. J'ajouterai que, sur le Banc de Burdwood, par la très faible profondeur de 56 brasses, il a été pris plusieurs fragments d'Hexactinellides dont je n'ai même pas pu soupçonner le genre ; ce sont des masses feutrées, compactes, sans orifices ni canaux visibles, sans structure définie, composées surtout de diactines mais avec un mélange d'hexactines et de pentactines inégales et de beaucoup d'hexasters dont les rayons se montrent quelquefois bifides, quand leur taille est très faible. J'ai photographié deux de ces masses (Pl. III. fig. 10). Elles m'ont rappelé dans une certaine mesure les masses feutrées de spicules de Rossellides que le *Français* a recueillies en abondance (28, p. 11) dans un dragage auprès de l'île Anvers, à peu près par la même profondeur ; pourtant, les spicules sont ici ordinairement en bon état et je crois qu'il s'agit cette fois d'Eponges roulées plutôt que d'amas de spicules façonnés par des courants.

I. S.O. HEXASTEROPHORA.

Famille Euplectellidæ.

Malacosaccus pedunculatus, Topsent.

1910. *Malacosaccus pedunculatus*, Topsent (30, p. 1).

Station 417, 18 mars 1904 ; 71° 22′ lat. S., 16° 34′ long. W. ; profondeur, 1410 brasses.

Le type de cette espèce est de tous les *Malacosaccus* recueillis jusqu'à présent celui dont la forme peut recevoir la description la plus complète. En raison de sa mollesse, il n'a naturellement pas pu subir sans de graves dommages les brutalités d'un engin qui l'a traîné sur la vase avant de le ramener d'une profondeur aussi considérable ; il est

arrivé à la surface divisé en deux morceaux plus ou moins détériorés, mais ses débris suffisent à imaginer de l'ensemble une restauration qui ajoute à la connaissance de la forme des *Malacosaccus* : le rebord de la coupe peut avoir un bourrelet marginal et le corps est porté sur une colonne de triactines.

L'un des fragments se présente comme une grande plaque spongieuse, très molle, haute de 14 centimètres, large de 18 centimètres à un bout et de 12 centimètres à l'autre, épaisse de 4 à 7 millimètres ; un bourrelet, qui limite son côté le plus étendu, contraste avec les autres bords, effilochés, et marque de toute évidence le bord supérieur de l'Eponge. Les deux faces de la plaque s'orientent aisément grâce à la différence de leurs orifices. En pliant la plaque la face cloacale en dedans, le bourrelet marginal en haut, de manière à placer ses bords latéraux en regard l'un de l'autre, on lui redonne presque ce qui semble avoir été sa forme naturelle, celle d'un calice, qu'un accident a fendu et ouvert de haut en bas. Un tel calice mesure, à cet état, 14 centimètres de hauteur, 9 centimètres de largeur en haut et 6 centimètres environ vers le bas. A supposer que sa section ait été circulaire dans des conditions normales, son diamètre extérieur, à l'entrée, devait être à peu près de 6 centimètres ; mais sa mollesse est telle que, dans l'alcool, ses moitiés repliées s'aplatissent l'une sur l'autre. Les parois de ce long calice ont leur maximum d'épaisseur vers sa base, puis vont doucement s'amincissant jusqu'au niveau du bourrelet marginal. Celui-ci est large de 10 à 12 mm. Dans les conditions où je l'observe, il apparaît comme une bande imperforée, densément veloutée, nettement limitée, et tout entière située en bordure de la face cloacale ; mais on peut supposer que les bords du calice se tenaient, durant la vie, quelque peu évasés et ramenaient le bourrelet dans une position à peu près horizontale. Notons de suite qu'il ne porte pas le moindre vestige d'une frange ciliée. La face externe du calice est percée de nombreux orifices, plus ou moins circulaires, pour la plupart petits (1 mm. à 1·5 mm.) mais atteignant souvent 3 mm. et plus de diamètre. Ils ont dû être tous tendus d'un réseau d'hexactines en glaive, qui, par places, les recouvre encore. Ces hexactines dermiques forment aussi un revêtement aux portions charnues comprises entre les orifices, et leur actine distale, bien développée, donne à toute la surface du corps une légère hispidation, perceptible à l'œil nu. A la face cloacale sont béants, comme chez *Malacosaccus vastus*, de grands orifices composés, larges de 8 à 12 mm., dont les intervalles se parsèment en outre de perforations beaucoup plus étroites. Par en bas, une déchirure profonde entame la paroi. C'est de là, selon toute probabilité, que le second fragment s'est détaché, mais non sans une certaine perte de substance, car il est actuellement impossible de remettre en rapport d'une façon satisfaisante les parties disjointes.

Autant le premier fragment, qui représente le corps de l'Eponge, ressemblait à l'unique morceau de *Malacosaccus vastus* obtenu par le *Challenger* (**12**, pl. xviii. fig. 1), autant le second, qui en figure l'appareil de fixation, rappelle un spécimen de *M. floricomatus* recueilli par la *Princesse-Alice* (**27**, pl. iii. fig. 10). C'est, de même, une colonne très molle, relativement longue (10 cm.) pour son épaisseur (2 cm.) et

terminée par de belles soies fasciculées. La colonne est pleine ; sa surface, diversement plissée, a beaucoup souffert et ne montre d'orifices pareils à ceux du *M. floricomatus* en question que tout-à-fait en bas, à la naissance des soies. Celles-ci se disposent en deux touffes bien distinctes, parallèles mais fort inégales, l'une très fournie, épaisse de 3 mm. et longue de 95 mm., l'autre plus maigre, n'atteignant guère que le tiers de cette longueur.

Comme les soies ont elles-mêmes beaucoup de souplesse, on se demande comment une Eponge aussi molle et d'aussi grandes dimensions peut s'être tenue debout sur un système aussi peu résistant. Cependant, la spiculation étant identique, les deux fragments appartiennent certainement à une même espèce du genre *Malacosaccus* : or, considérer ce corps caliciforme et cette base fixatrice comme provenant de deux spécimens différents recueillis en même temps, serait moins logique que les tenir pour des parties d'un seul et même individu et ne modifierait pas la conception qu'ils nous suggèrent de la forme générale de *M. pedunculatus*.

La charpente du parenchyme se compose typiquement d'hexactines souples à actines lisses, très légèrement renflées au bout, longues de 1 mm. à 1·8 mm., épaisses seulement de 0·013 mm. à la base et de 0·007 mm. vers l'extrémité ; mais, au voisinage des deux faces comme au pourtour des canaux qui traversent le corps, elles se modifient pour ne déterminer aucune hispidation et, perdant une de leurs actines ou plusieurs, se réduisent en pentactines, en triactines, plus rarement en tétractines, jamais en diactines.

Le réseau dermique est fait, comme d'habitude, d'hexactines en glaive ; leur actine distale, longue de 0·3 mm., en moyenne, se renfle, devient fusiforme, épaisse de 0·008 mm. à 0·012 mm., et se couvre d'épines appliquées, relevées vers la pointe libre ; les actines tangentielles, faiblement épineuses, sont un peu plus longues que la distale (0·38 à 0·4 mm.) et de moindre épaisseur qu'elle ; quant à la proximale, lâchement épineuse et souvent flexueuse, c'est de beaucoup la plus grêle et la plus longue, car elle varie entre 0·75 mm. et 1 mm. Au niveau du bourrelet marginal, ces spicules se serrent davantage, leurs actines tangentielles prenant alors la même longueur que la distale ; celle-ci est presque toujours surmontée d'un floricome. C'est à l'ensemble de ces pointes plus nombreuses et ornementées, ainsi qu'à l'absence d'orifices entre elles, que le bourrelet marginal, en relief sur les parties avoisinantes, doit son aspect particulier. A la base des touffes fixatrices, les hexactines en glaive ont leur actine distale très développée.

A la face cloacale aussi se trouvent des hexactines en glaive, mais par places seulement ; les mégasclères de revêtement de cette face sont pour la plupart des pentactines, à actine distale réduite à l'état de tubercule court, à actines tangentielles longues de 0·22 mm. à 0·38 mm. et à proximale de 0·4 mm. Les hexactines, là où elles se rencontrent, m'ont paru avoir une actine distale plus courte (0·23 mm.) que l'actine correspondante des hexactines dermiques.

Malacosaccus pedunculatus ne possède pas d'hexactines hypodermiques.

Les microsclères sont : 1. des *floricomes*, à rayons primaires courts, portant 8 ou 9 rayons secondaires très arqués, très grêles à la base, puis renflés et terminés par une palette de 0·01 mm., qu'ornent 6 à 8 dents marginales. Ils abondent sur le bourrelet marginal et y atteignent 0·145 mm. de diamètre. Ils demeurent un peu plus petits (0·12 mm.) sur le reste de la surface de l'Eponge. Ils ne sont pas rares, avec 0·1 mm. à 0·12 mm. de diamètre, dans le parenchyme. Enfin, je les observe, avec un diamètre de 0·1 mm., en trop grand nombre à la face cloacale pour ne pas admettre qu'ils s'y trouvent en place.

2. Des *discohexasters*, à rayons primaires courts, portant chacun quelquefois trois mais le plus souvent deux rayons secondaires presque droits, raboteux, un peu épaissis (ils passent de 0·002 mm. à 0·0035 mm.) au-dessous de leur disque terminal, lequel est large de 0·006 mm. à 0·011 mm. et porte de petites dents à son pourtour. Le diamètre de ces discohexasters varie entre 0·1 mm. et 0·17 mm. Sans diminuer sensiblement de taille, elles ont parfois leurs rayons secondaires très grêles, lisses, un peu renflés quand même au bout, au-dessous du disque, qui est alors étroit mais s'orne en revanche de dents plus longues. Il existe de ces spicules un peu partout, dans le parenchyme, auprès de la surface et à la base des touffes de soies ; cependant ils s'y montrent toujours clairsemés.

3. Des *oxyhexasters*, à rayons secondaires par deux et pointus. Je n'en ai pu découvrir que trois ou quatre, de sorte que je n'ose affirmer qu'elles appartiennent réellement à notre Eponge.

Les touffes fixatrices se composent, comme chez *Malacosaccus floricomatus*, de triactines lisses dérivées d'hexactines ; deux des actines qui leur restent, s'orientant suivant le grand axe de la touffe, acquièrent une grande longueur, tandis que la troisième, qui leur est perpendiculaire, demeure beaucoup plus courte ; c'est par cette dernière seulement que les soies se tiennent entre elles, car il ne se développe nulle part de synapticules. Ces triactines sont de taille très inégale, tous les intermédiaires existant entre celles qui, donnant aux touffes leur aspect fibrillaire, arrivent à dépasser 6 centimètres de longueur sur 0·17 mm. d'épaisseur et celles, en quantité bien supérieure, qui restent fines et relativement courtes et forment un remplissage entre les précédentes. En outre, de leurs deux actines axiales, l'une prend fréquemment un plus grand développement que l'autre, de sorte que l'actine transversale ne se détache pas du spicule en son milieu mais plus ou moins près de l'une de ses extrémités.

Des prélèvements effectués en divers points de l'appareil fixateur ne m'ont pas fourni une seule ancre.

En résumé, *Malacosaccus pedunculatus* offre dans sa spiculation des particularités qui le caractérisent bien en tant qu'espèce. Il est le premier dont le revêtement cloacal comprenne des pentactines. Ses floricomes se rapprochent par leur forme de ceux de *M. vastus*, mais ses discohexasters sont plus simples que partout ailleurs. Les onychasters lui font défaut et peut-être même les oxyhexasters.

Malacosaccus coatsi, Topsent. (Pl. II. fig. 4 et 5, et Pl. VI. fig. 1.)

1910. *Malacosaccus coatsi*, Topsent (**30**, p. 3).

Station 417, 18 mars 1904; 71° 22′ lat. S., 16° 34′ long. W.; profondeur, 1410 brasses.

Les notions que le type de *Malacosaccus pedunculatus* nous a fournies sur la morphologie des Eponges du genre *Malacosaccus* se trouvent en quelque sorte complétées par celui de *M. coatsi*; celui-là, malgré une déchirure longitudinale, n'a rien perdu de sa partie supérieure; celui-ci possède au complet son appareil de fixation. Grâce à eux, les *Malacosaccus* se révèlent comme des *Euplectellinæ* en forme de coupe molle, portée par un pédoncule qu'une touffe d'ancres termine et fixe dans la vase. Le plus beau des pédoncules recueillis de *M. floricomatus* aurait pu faire deviner un tel mode d'attache, mais tout démontre aujourd'hui que je lui ai d'abord prêté une orientation inverse de celle qui lui est naturelle (**27**, pl. i. fig. 1). Fort bien caractérisé, d'ailleurs, par ses beaux floricomes à rayons terminaux en groupes de quatre, par ses petites onychasters périphériques et par ses hexactines hypodermiques spéciales, *M. floricomatus* est, de tous, celui dont on connaît le moins bien la forme. La *Princesse-Alice* n'en a obtenu que trois fragments charnus, dont deux, prolongés en un commencement de pédoncule, représentent manifestement des bases de spécimens, correspondent au fragment inférieur de *M. pedunculatus* et sont, comme lui, dépourvus de cavité axiale; le troisième est plus aplati, mais je n'ai pas cru devoir le considérer comme un lambeau de la portion supérieure d'un grand spécimen tubuleux, pour ces motifs que ses bords tournent et que les spicules se répètent sur ses deux faces.

Il est bien difficile de se faire une opinion ferme sur de tels fragments et la mienne, d'après laquelle *M. floricomatus* manquerait de cavité cloacale et constituerait ainsi une véritable exception, a besoin d'être corroborée. Je suis revenu de la surprise que m'a causée l'existence par tout son parenchyme de floricomes nombreux, alors que, chez les seules espèces avec lesquelles la comparaison était alors possible (*M. vastus* F. E. Sch. et *M. unguiculatus* F. E. Sch.), ces microsclères avaient été notés comme exclusivement cantonnés à la pointe des hexactines dermiques: d'autres exemples très nets de leur répartition par toute l'épaisseur du corps nous sont, en effet, offerts maintenant par les deux *Malacosaccus* de la *Scotia*. Ce qui paraissait étrange à ce sujet semble désormais naturel. Mais je me rends compte que la découpure en gros lobes des parois de *M. coatsi* peut conduire à se demander si *M. floricomatus* a réellement le corps plein ainsi que ce que j'en ai vu me l'a fait admettre.

Il est regrettable que ce *Malacosaccus coatsi* ait lui-même sa partie spongieuse si gravement endommagée. Cupuliforme dans son ensemble, celle-ci contraste avec la partie homologue des *M. vastus*, *M. unguiculatus* et *M. pedunculatus* par une allure fort irrégulière. Ses parois, dès la base, se soulèvent en de grosses tubérosités qui lui donnent un aspect lobé. Entre les tubérosités s'étendent des plis profonds et même, sur un côté (Pl. II. fig. 5, à gauche), une haute échancrure par laquelle la cavité cloacale

communique largement avec l'extérieur. Epaisses, en grande partie, de 13 à 15 mm., les parois conservent cependant une grande mollesse; aussi se sont elles déchirées avec trop de facilité. On ne peut plus se faire une idée de ce qu'était l'ouverture cloacale: l'échancrure précitée laisse seulement supposer qu'elle devait manquer de symétrie. De même, il est difficile de dire si le corps spongieux était beaucoup plus vaste que ses débris ne le montrent; pour ma part, je ne le crois pas, parce qu'un lambeau actuellement détaché, qui complétait sans doute la coupe (Pl. II. fig. 5, à droite et en avant), haut de 6 centimètres, va s'amincissant jusqu'à mesurer moins de 2 mm. d'épaisseur. De ce côté, la hauteur totale de la coupe, en comptant les grosses tubérosités de sa base, ne serait guère que de 8 à 9 centimètres. Son plus grand diamètre est de 7 centimètres, y compris toute l'épaisseur des parois. La surface, anfractueuse, mais très faiblement hispide, a possédé un revêtement réticulé continu; dans les points seulement où il a été enlevé, les orifices, inégaux, sans ordre, se montrent à nu.

La cavité cloacale, étranglée par le plissement des parois, est, on le conçoit, fort tourmentée; relativement étroite, elle se divise, au niveau du sommet de la plus grosse tubérosité inférieure, en trois diverticules inégaux, dont le plus vaste se prolonge encore verticalement sur une longueur de 4 centimètres. La surface cloacale, unie, très finement hispide, se perce d'orifices en général plus petits que ceux de la face externe, rarement larges et composés, toujours nus et béants.

Le pédoncule a une taille peu en rapport avec ce qui reste de la portion charnue et probablement même avec ce que fut cette partie de l'Eponge. C'est une colonne solide, un peu noueuse dans son tiers supérieur, marquée en bas d'un bourrelet annulaire, puis fortement renflée en un bulbe porteur d'une abondante touffe de soies. Le tout mesure, à partir du bas de la grosse tubérosité spongieuse et sans compter les soies, environ 38 centimètres de longueur. Le diamètre n'a pas moins de 7 centimètres au niveau du bulbe; il se réduit à 5 centimètres au niveau du bourrelet annulaire et à 3 centimètres vers le milieu de la longueur du pédoncule proprement dit; mais ce dernier est un peu aplati dans sa région médiane et ne mesure pas 2 centimètres comme autre dimension. Ces diverses parties de l'appareil fixateur ont leurs homologues dans le pédoncule de *Malacosaccus floricomatus* que j'ai fait dessiner (**27**, pl. i. fig. 1), par méprise, la base en haut. Le pédoncule n'a plus son revêtement d'hexactines en glaive que dans sa portion noueuse et au voisinage du bourrelet annulaire, et, par suite, paraît fibreux sur la majeure partie de son étendue. Le bourrelet annulaire est lisse et blanc; nous verrons qu'il est constitué par une accumulation de petites hexactines, déjà observée au point correspondant chez *M. floricomatus*. Le bulbe, enfin, se compose d'une masse d'hexactines semblables dans laquelle s'implantent en outre des ancres; un nombre considérable d'ancres brisées tout près de sa surface et les traces de la vase dans laquelle il s'enfonçait, le rendent hispide et grisâtre.

Spiculation.—Les spicules dermiques sont des hexactines en glaive (Pl. VI. fig. 1*a*), d'une ressemblance frappante avec leurs homologues de *Malacosaccus pedunculatus*; l'actine distale, claviforme, longue de 0·31 mm. à 0·38 mm., épaisse de 0·015 mm. à

0·022 mm. en son renflement subterminal, porte des épines retroussées, faibles, souvent réduites à l'état de tubercules ; les autres actines sont fines et à peine rudes, la proximale habituellement fort longue et souple, les tangentielles égales à la distale ou seulement un peu plus longues qu'elle. Ces mégasclères dessinent un réseau carré ou plus fréquemment rectangulaire, à mailles larges de 0·35 mm. à 0·38 mm., chaque actine tangentielle de l'un d'eux s'accolant à une actine tangentielle d'un spicule voisin et se terminant à une faible distance du pied de son actine distale. Sur le pédoncule, les hexactines dermiques, au lieu de dessiner un réseau, entrecroisent leurs actines tangentielles et se serrent, par conséquent, davantage les unes contre les autres. Elles y changent, en outre, un peu de caractère (Pl. VI. fig. 1*b*) : l'actine distale reste plus courte (0·23 mm. à 0·24 mm.) mais devient plus grosse (0·024 mm. à 0·028 mm.) ; les autres actines s'épaississent (0·013 mm. à 0·015 mm. à la base au lieu de 0·006 mm. à 0·008 mm.) et accusent leurs épines ; la proximale atteint moins de deux fois la longueur des tangentielles.

Les spicules gastriques sont des hexactines, à actines épineuses, la distale longue de 0·23 mm. à 0·24 mm., plus brève, par conséquent, que celle des hexactines de la surface du corps, plus mince aussi et non claviforme mais fusiforme (Pl. VI. fig. 1*c*), avec 0·013 mm., par exemple, d'épaisseur en son milieu et seulement 0·008 mm. à quelque distance de sa pointe ; les tangentielles un peu plus longues et la proximale un peu plus encore. Par places seulement, ils se réduisent en des pentactines pareilles à celles de *M. pedunculatus*. Ils forment, comme les spicules dermiques, un réseau régulier à mailles de 0·26 mm. environ ; mais, en outre, en bien des points, sinon partout, ils se disposent en deux rangs superposés.

Les mégasclères du parenchyme sont des hexactines (Pl. VI. fig. 1*d*) à actines longues et souples, épaisses de 0·013 mm. à 0·02 mm. à leur origine, lisses, à pointes obtuses. Elles se réduisent fréquemment en pentactines aux approches des parois des canaux ou des deux faces du corps. Elles subissent en outre au-dessous du revêtement dermique une importante modification qui ne s'observe pas chez *Malacosaccus pedunculatus* : elles doublent (0·03 mm. à 0·04 mm.) l'épaisseur de leurs actines et souvent se réduisent en pentactines (Pl. VI. fig. 1*e*) ; augmentant dans une certaine mesure la consistance de la chair au voisinage de la surface, elles remplacent évidemment, à ce niveau, les hexactines hypodermiques plus hautement différenciées de *M. floricomatus*.

Ce sont les mêmes spicules que ceux du parenchyme qui forment le pédoncule, mais, à cette fin, ils se réduisent presque tous en pentactines, en tétractines ou en triactines. Les mégasclères principaux sont même toujours ramenés à l'état de triactines spéciales, à actines paires placées bout-à-bout suivant le grand axe de l'organe, à actine impaire beaucoup plus courte et plus grêle, recourbée dans la direction du corps spongieux et engagée entre les autres spicules pour les maintenir en place. Certaines de ces triactines atteignent 7 centimètres de longueur et près de 0·5 mm. d'épaisseur en leur milieu.

Le bourrelet annulaire consiste en un feutrage d'hexactines inégales, à actines droites, fines, épineuses, longues de 0·04 mm. à 0·05 mm. seulement, semblables à celles qui revêtent le renflement basilaire du plus beau pédoncule connu de *Malacosaccus floricomatus*.

Les mêmes hexactines, densément enchevêtrées, forment encore le bulbe, avec addition des ancres. Celles-ci sont remarquables en ce que le croisement de leurs trois axes s'opère non pas, comme chez les *Euplectella*, à une certaine hauteur le long de leur tige barbelée, mais dans l'intérieur de leur grappin terminal. Cinq des actines ont donc avorté et l'ancre a la valeur d'une monactine. F. E. Schulze (**13**, p. 65, pl. vi. fig. 16) a déjà observé pareille particularité chez *Placopegma solutum*, mais, comme le nombre des dents qu'y porte le grappin des ancres se trouve être précisément de quatre, il a cru pouvoir tenir ces dents pour autant d'actines de longueur réduite. Les ancres de *Malacosaccus coatsi* ne permettent point une telle interprétation, les 6 dents de leur grappin conique ne correspondant certainement pas à 4 actines. Nous verrons de même des ancres monactinales chez d'autres Euplectellines, *Acalocalyx brucei* et *Docosaccus ancoratus*.

Les microsclères ne diffèrent que par des détails de ceux de *M. pedunculatus*.

Les *floricomes* se rencontrent dans toutes les parties de la coupe : à la surface, en rapport avec le rayon distal des hexactines dermiques ; dans le parenchyme, surtout au pourtour des canaux ; du côté cloacal, enfin, au-dessous de l'assise limitante d'hexactines gastriques, sans le moindre rapport, par conséquent, avec l'actine libre de ces spicules. Chacun de leurs rayons primaires, court, comme d'habitude, porte 8 ou 9 rayons secondaires beaucoup plus longs, grêles à leur origine, puis doucement renflés à mesure qu'ils se recourbent en dehors, enfin terminés par une palette étroite dont le bord extrême se découpe en 4 à 6 dents aiguës. Le diamètre des floricomes n'est que de 0·105 mm. à 0·11 mm.

Les *discohexasters* se répandent aussi par tout le corps ; mais c'est au voisinage de sa surface qu'elles se trouvent le plus nombreuses et qu'elles prennent leur plus beau développement. Leurs rayons secondaires se groupent toujours par 3 à 5. Leur diamètre, qui varie entre 0·08 mm. et 0·1 mm., est généralement en rapport avec la grosseur de ces rayons. Les plus belles (Pl. VI. fig. 1*m*) se singularisent presque toutes par une tendance à imiter les floricomes ; leurs rayons secondaires, en effet, ne se terminent pas par un disque véritable, mais par une expansion oblique à bord denté du côté libre seulement ; beaucoup de ces rayons présentent même une courbure, parfois très brusque, destinée à rejeter leur terminaison en dehors du groupe mais, maladroitement, produisant souvent un effet contraire. La courbe, de direction encore plus hésitante sur des discohexasters moins robustes, se transforme fréquemment en une ondulation. Les discohexasters à rayons très grêles que la chair renferme seules, ressemblent plus rarement, même de loin, aux floricomes ; leurs rayons, à courbure très douce, ont pour la plupart une expansion terminale fixée en son milieu et découpée en dents si profondes que le disque à proprement parler fait défaut (Pl. VI. fig. 1*n*).

Les *oxyhexasters* sont rares, grêles, à rayons secondaires par trois ; elles paraissent se cantonner auprès de la surface du corps.

En résumé, indépendamment de ses caractères extérieurs, *Malacosaccus coatsi* possède dans sa spiculation quelques traits importants qui le distinguent de *M. pedunculatus* ; sa surface est renforcée par des hexactines épaissies ; son revêtement gastrique se compose d'hexactines en glaive ; ses discohexasters, abondantes et à rayons nombreux, se rapprochent du type floricome.

J'ai attaché à cette espèce le nom de MM. JAMES et ANDREW COATS, dont la générosité a beaucoup contribué à rendre possible l'expédition antarctique nationale écossaise.

Genre *Acœlocalyx*, Topsent.

Euplectellinæ dont le corps très mou, creusé d'une cavité cloacale à bourrelet marginal, mais sans profondeur, est porté sur un pédoncule qui se termine par une touffe d'ancres. Les orifices, assez grands, se distribuent sur toute la surface et sont recouverts d'un réseau spiculeux. Les mégasclères dermiques et cloacaux sont des hexactines en glaive. Le squelette du parenchyme se compose d'hexactines souples, distribuées d'une façon irrégulière. Elles se modifient en triactines pour constituer le pédoncule. Il n'existe pas de floricomes ; les seuls microsclères présents sont des discohexasters et des oxyhexasters.

Le genre *Acœlocalyx* prend place à côté du genre *Malacosaccus* parce que le squelette sans ordre, fait d'hexactines souples, laisse chez l'un et chez l'autre une grande mollesse au corps, et parce que, chez tous deux, l'appareil fixateur est semblablement constitué. Il s'en distingue par la forme de la partie spongieuse du corps ainsi que par le manque absolu de floricomes. Il possède cette dernière particularité en commun avec *Holascus*, un autre genre d'Euplectellines, mais la ressemblance de ce côté ne va pas plus loin.

Acœlocalyx brucei, Topsent. (Pl. I. fig. 1 et 2, et Pl. VI. fig. 4.)

1910. *Acœlocalyx brucei*, Topsent (30, p. 5).

Station 301, 13 mars 1903 ; 64° 48′ lat. S., 44° 26′ long. W. ; profondeur, 2485 brasses.

Un seul spécimen, mais dans un état de conservation absolument remarquable, étant donné ses dimensions et sa gracilité ainsi que la profondeur d'où il fut ramené. Sa longueur totale dépasse un peu 40 centimètres, dont environ 15 pour le corps spongieux, 22 pour le pédoncule et 4 pour la touffe fixatrice.

Le corps, excessivement mou, est de forme élancée, comprimée ; large de 23 millimètres un peu au-dessus de son attache et de 44 millimètres en son bord supérieur, il n'est épais que de 10 millimètres par en bas et de 7 ou 8 millimètres seulement vers le haut. Il a dû cependant être un peu plus cylindrique ; on peut supposer, en effet, que l'orifice, en fente large aux lèvres, qu'il présente en son sommet, était béant pendant

la vie pour permettre l'évacuation de sa cavité cloacale et retroussait plus ou moins ses bords en dehors.

Sur ces bords s'étend un bourrelet marginal continu, sans frange ciliée, large de 4 à 5 millimètres, en relief et bien délimité, imperforé, d'aspect velouté comme celui de *Malacosaccus pedunculatus* dont il est l'homologue évident et dont il a la constitution. La surface du corps, intacte, sauf au voisinage du pédoncule sur les deux faces, est tapissée par un réseau spiculeux à mailles carrées, dont chaque nœud se soulève en une petite épine ; nous verrons que les éléments constitutifs de ce réseau sont des hexactines en glaive et que c'est par leur actine distale différenciée qu'ils déterminent une hispidation brève de l'Eponge. Le réseau passe sans se modifier au-devant des orifices percés dans la paroi du corps, permettant quand même de les voir facilement par transparence. Ils se répartissent assez bien en deux catégories : les uns, ovales ou polygonaux, plus grands, n'excédant pas pourtant 1·5 mm. de diamètre, distants de 2 à 3 millimètres ; les autres, plus ou moins punctiformes, semés dans les intervalles entre les premiers. La cavité cloacale, extraordinairement réduite par rapport à la hauteur du corps, n'est, en somme, qu'une petite poche de 2 centimètres à peine de profondeur et assez irrégulière, son fond manquant de limite nette ; ses parois sont percées d'orifices de même taille que ceux de la face externe mais nullement tendus d'un réseau spiculeux.

Le pédoncule, presque rigide, un peu compressible toutefois, est droit, à peu près cylindrique, avec un diamètre moyen de 6 millimètres. Il a évidemment porté sur toute son étendue un revêtement d'hexactines dermiques qui continuait à sa surface l'hispidation du corps ; mais des frottements l'en ont en majeure partie dépouillé, mettant à nu ses longues soies parallèles et le faisant paraître fibreux.

La touffe fixatrice commence par un renflement épais de 12 millimètres, où s'entassent parallèlement des triactines et des ancres et que recouvrent encore des hexactines dermiques ; puis, se réduisant à des ancres, elle devient un pinceau bien souple.

Dans son ensemble, la spiculation offre des caractères spécifiques très saisissables.

Le parenchyme a pour mégasclères des hexactines à actines lisses mesurant couramment 2 millimètres de longueur mais seulement de 0·01 mm. d'épaisseur à la base et de 0·005 mm. bien avant la pointe, fines et souples, par conséquent, et tout à fait impropres à lui constituer une charpente quelque peu solide. Au voisinage des surfaces et au pourtour des canaux qui traversent la chair, elles se réduisent en pentactines, quelquefois même en stauractines, mais jamais en diactines.

Les hexactines en glaive du réseau dermique ont l'actine distale légèrement renflée en massue à pointe conique, ornée d'épines basses, longue de 0·33 mm. à 0·37 mm., épaisse de 0·017 mm. à 0·02 mm. à sa naissance et de 0·02 mm. à 0·023 mm. au-dessous de sa pointe ; leurs actines tangentielles sont longues de 0·45 mm. et la proximale de 0·3 mm. à 1·4 mm., suivant leur position ; ces dernières sont lâchement et faiblement épineuses. Les hexactines du bourrelet marginal, plus serrées, n'ont pas leurs actines tangentielles plus longues que la distale ; leur actine proximale est toujours très longue

et grêle. Celles de la surface du pédoncule ont, au contraire, l'actine proximale assez courte ; elles conservent une longueur égale à leurs autres actines mais épaississent la distale (0·03 mm. à 0·04 mm.) et en accusent les épines.

Il existe encore des hexactines en revêtement de la cavité cloacale et jusque dans les parois des canaux larges de l'Eponge. La longueur respective des actines y est la même que sur les hexactines dermiques, soit 0·35 mm. pour la distale, 0·45 mm. pour les tangentielles et 1·5 mm. environ pour la proximale ; mais la distale s'y différencie moins ; on la reconnaît surtout à ce qu'elle est beaucoup plus rugueuse que les autres, car elle est à peine fusiforme et ne mesure que 0·009 mm. à 0·012 d'épaisseur. On voit de temps en temps, dans les parois des canaux, cette actine réduite à un court tubercule.

Les soies du pédoncule sont des hexactines modifiées en triactines, de grosseur et de longueur très inégales, car il en est qui constituent la charpente principale de l'organe alors que les autres ne forment qu'un feutrage entre les précédentes. Les plus belles atteignent 13 centimètres de longueur et 0·3 mm. d'épaisseur ; les autres peuvent n'avoir que quelques millimètres et ne pas dépasser 0·015 mm. d'épaisseur. Deux actines opposées se développent beaucoup et s'orientent suivant le grand axe du pédoncule ; l'une, qui se tourne du côté du corps, devient d'habitude sensiblement plus longue que l'autre, dirigée vers la touffe fixatrice ; de sorte que l'actine impaire ne se dégage pas de la soie à égale distance de ses extrémités ; cette actine impaire est beaucoup plus courte que les autres et, sur les grands spicules, demeure beaucoup plus grêle ; elle forme d'abord un angle droit sur la soie, puis brusquement se recourbe pour remonter vers le corps sans pourtant s'allonger parallèlement à elle ; sa torsion compliquée lui permet au mieux de s'insinuer entre les soies adjacentes et de les maintenir en place. Le pédoncule acquiert de la sorte une résistance suffisante sans le secours de synapticules.

Les ancres de la touffe fixatrice sont aussi de longues soies, pointues au bout proximal et lisses sur une bonne partie de leur étendue, puis armées de crochets récurvés, enfin terminées par un cône à base entourée d'une demi-douzaine de dents. De forme banale, en somme, elles ont cependant quelque chose de particulier : leur centre réel, marqué par l'entrecroisement des trois lignes du filament axial, au lieu de se trouver plus ou moins haut le long de la tige, est situé exactement dans l'épaisseur du grappin (Pl. VI. fig. 4*c*). Ces ancres ne sont donc pas des diactines, comme d'ordinaire chez les *Euplectella* et les *Holascus*, mais de véritables monactines C'est une particularité qui se retrouve, ai-je dit, chez trois des Euplectellines de la *Scotia*.

Les microsclères sont de deux sortes, très abondantes l'une et l'autre :

1. Des *discohexasters* robustes (Pl. VI. fig. 4*a*), de 0·175 mm. à 0·2 mm. de diamètre, à rayons principaux courts (0·005 mm.) émettant chacun deux ou trois rayons terminaux divergents, assez droits ; ceux-ci, lisses, épais de 0·0025 mm. à leur naissance, se renflent du double un peu au-dessous du disque ; le disque est lui-même large de 0·016 mm. à 0·018 mm. et porte en petit nombre (5 à 7, quelquefois 4 ou même 3 seule-

ment) des dents puissantes. Les discohexasters se distribuent par tout le corps ; dans le parenchyme et au voisinage du court cloaque, elles ne produisent qu'exceptionnellement 3 rayons terminaux par rayon principal ; l'exception devient la règle près de la surface du corps et surtout dans l'épaisseur du bourrelet marginal.

2. Des *oxyhexasters* (Pl. VI. fig. 4*b*) d'une gracilité remarquable, grandes quand même, leur diamètre habituel mesurant 0·175 mm. Leurs rayons principaux, longs de 0·007 mm. à 0·009 mm., se continuent par deux ou trois rayons secondaires (trois surtout dans les parties superficielles de l'Eponge, deux dans ses parties profondes), épais à peine de 0·0013 mm. à leur origine, puis progressivement amincis, filiformes et flexueux.

Genre *Docosaccus*, Topsent.

Euplectellinæ probablement sacciformes et fixées par des touffes d'ancres. Elles ont des parois minces mais rigides, dont les perforations nombreuses ne s'étendent pas directement d'une face à l'autre. Les hexactines du parenchyme y forment deux catégories distinctes : les unes souples, pas très grandes, correspondant aux hexactines des *Malacosaccus* et se réduisant fréquemment en diactines ; les autres, bien moins nombreuses, mais de taille considérable, ne développant bien que quatre de leurs actines suivant l'épaisseur des parois du corps, où elles se croisent sans ordre et auxquelles elles constituent une charpente fondamentale dépourvue de symétrie. Les spicules de revêtement de la face dermique, comme aussi ceux de la face cloacale, sont des hexactines en glaive. Il existe en fait de microsclères des floricomes, des oxyhexasters et des discohexasters.

Docosaccus ancoratus, Topsent. (Pl. III. fig. 4 et Pl. VI. fig. 6.)

1910. *Docosaccus ancoratus*, Topsent (30, p. 8).

Station 301, 13 mars 1903 ; 64° 48′ lat. S., 44° 26′ long. W. ; profondeur, 2485 brasses.

Quatre fragments, quatre petites plaques irrégulières, dont l'épaisseur ne dépasse pas 2 millimètres, et qui, toutes cintrées suivant une courbure à long rayon, paraissent provenir d'une large coupe à parois minces. Des orifices très nombreux et sans ordre les percent, différents d'aspect sur les deux faces, ceux de la face externe simples, généralement petits, ceux de la face cloacale plus grands et manifestement constitués par la convergence de plusieurs canaux courts. Les deux faces sont couvertes d'une hispidation fine, due à la projection de l'actine distale de tous les spicules superficiels, un peu plus haute, cependant, en dehors qu'en dedans. L'un des fragments présentait en plus des autres, sur sa face externe, groupées vers l'un de ses bords et distantes les unes des autres d'environ 4 ou 5 millimètres, sept ou huit protubérances coniques dont plusieurs portaient encore en leur sommet une touffe assez dense de soies fort longues. La photographie, faite de face, ne donne qu'une idée très imparfaite de cette intéressante particularité. Les soies en question étant des ancres, leur direction indique l'orienta-

tion naturelle de la plaque dont elles émanent et permet de supposer que celle-ci se trouvait plus près que les autres de la base du corps. On ne saurait, malgré cela, imaginer une restauration de l'Eponge.

A sa spiculation, on la reconnaît aisément comme une Euplectellide. Ses touffes de soies semblent même annoncer un mode de fixation d'Euplectelline plutôt que de Corbitelline. J'accorde à ce léger indice d'autant plus de confiance qu'aucune des Corbitellines connues ne présente une forme qui se puisse deviner dans nos fragments d'Eponge, une structure qui leur convienne, un ensemble de spicules qui soit très semblable au leur.

Se limitant donc aux *Euplectellinæ*, on ne peut songer à considérer notre Eponge comme un *Holascus*, puisque les espèces de ce genre gardent leurs parois imperforées, se font une charpente à mailles rectangulaires et ne produisent pas de floricomes. Les *Euplectella*, d'autre part, présentent entre elles un air de parenté qui ne se retrouve pas dans nos fragments ; du reste, elles ont toujours une charpente régulière, presque toujours des perforations pariétales disposées avec ordre et le plus souvent des pentactines cloacales. Restent les *Malacosaccus*, sacciformes, à parois sans perforations étendues directement d'une face à l'autre, à charpente sans régularité, à spiculation comprenant des hexactines cloacales et des floricomes, C'est à côté d'eux, évidemment, que se place le type examiné, mais avec une différence appréciable dans la structure de ses parois ; celles-ci, beaucoup plus minces que celles des *Malacosaccus*, ont cependant une consistance bien plus ferme ; il s'y établit deux catégories distinctes de mégasclères du parenchyme, dont l'une, faite d'éléments de taille considérable, a pour but de constituer une charpente fondamentale rigide. Cette particularité est ce qui caractérise le nouveau genre *Docosaccus* en attendant que soient connus la forme générale et le mode de fixation de ses représentants.

La face convexe ou externe du corps de *Docosaccus ancoratus* est garnie d'un réseau d'hexactines en forme de glaives ; leur actine distale ou poignée est renflée, fusiforme et fortement épineuse, longue de 0·24 mm. à 0·38 mm., épaisse de 0·015 mm. à 0·025 mm. ; leurs actines tangentielles composant la garde sont moins ornées que la poignée, à peu près de même longueur qu'elle mais progressivement amincies jusqu'à leur extrémité ; leur actine proximale ou lame, enfin, est bien plus longue que toutes les autres (0·6 mm. à 1·2 mm.), plus grêle aussi et presque lisse, sauf à sa pointe. A ces hexactines dermiques correspondent, sur la face concave ou cloacale, d'autres hexactines n'en différant que par leurs proportions un peu plus faibles.

Les mégasclères du parenchyme qui se placent entre ces réseaux superficiels sont de trois sortes.

D'abord, comme pièces principales de la charpente, des hexactines de très grande taille. Elles restent incluses dans les parois, pourtant bien minces. A cet effet, elles ne donnent tout leur développement qu'à quatre de leurs actines et restreignent considérablement celui des deux autres (Pl. VI. fig. 6*a*). En outre, les actines bien développées prennent une disposition particulière : longues de 10 mm. à 20 mm.,

elles doivent à la fois conserver leur rigidité pour servir de soutien aux parties molles et permettre quand même l'enroulement du corps ; aussi s'étendent-elles entre les deux surfaces, non pas tout droit, mais en s'incurvant toutes à partir de leur origine d'un même côté, qui correspond toujours à la face cloacale ; de la sorte, elles parviennent à s'étendre à peu près parallèlement aux deux surfaces. Ces grandes actines, qu'on peut qualifier de tangentielles, sont lisses sauf vers leur extrémité, pointue et plus ou moins raboteuse ou bosselée ; elles mesurent environ 0·1 mm. d'épaisseur à la base. Les deux actines qui leur sont perpendiculaires restent infiniment plus courtes et ne se ressemblent même pas : celle qui monte du côté convexe du spicule, dans la direction de la surface externe de l'Eponge, est notablement plus brève et plus épaisse que celle qui se tourne vers la face cloacale. Cependant, à la base de chaque papille sétigère, il existe une grande hexactine qui est chargée d'en former l'axe. Celle-ci se comporte d'une manière un peu spéciale (Pl. VI. fig. 6*b*) : elle pousse encore quatre grandes actines tangentielles repliées du même côté et une actine cloacale plus grêle que toutes les autres, mais son actine dermique, robuste, s'allonge beaucoup plus que de coutume et atteint 6 à 7 millimètres de longueur. La disposition des grandes hexactines est tout-à-fait irrégulière : leurs actines tangentielles, s'entrecroisant sans ordre, ne dessinent pas de lignes longitudinales et transversales comme chez les *Euplectella* et les *Holascus*.

Quoique en nombre bien plus élevé, d'autres hexactines jouent, en raison de leurs dimensions modestes, un rôle secondaire dans la constitution de la charpente ; on peut les comparer aux fibres secondaires du squelette des Eponges cornées car elles forment comme elles, en se plaçant bout à bout, un réseau tendu dans le parenchyme entre les rayons des hexactines principales ; elles ont des actines lisses ou un peu rugueuses, plus ou moins flexueuses, souvent inégales, longues en moyenne de 0·5 mm. à 0·6 mm. et épaisses seulement de 0·01 mm. à 0·014 mm. à la base. On peut dire encore qu'elles correspondent aux hexactines souples du parenchyme des *Malacosaccus*.

Enfin, *Docosaccus ancoratus* possède des diactines, mais seulement en nombre restreint, si bien que ce sont les moins importants des mégasclères de son parenchyme. Bien moins fortes et beaucoup plus courtes que les actines tangentielles des grandes hexactines, elles n'en représentent en quelque sorte que des comitalia et se tiennent, pour la plupart, autour d'elles par maigres faisceaux parallèles à leur longueur, à la façon de ce que F. E. Schulze a décrit chez *Holascus ridleyi*. Leur épaisseur est de 0·012 mm. à 0·014 mm., à peu près la même, par conséquent, que celle des actines des petites hexactines. Comme elles aussi, elles se montrent souvent raboteuses, si bien qu'il serait naturel de réunir en une même catégorie diactines et hexactines. Pourtant, les termes de passage, les triactines, par exemple, s'observent en petit nombre. Au contraire, presque toujours les diactines montrent en leur centre un groupe de quatre tubercules bien marqués, correspondant à quatre actines atrophiées.

Les ancres des touffes fixatrices sont, comme d'ordinaire chez les *Euplectellinæ*, des soies longues de plusieurs centimètres ; lisses sur la majeure partie de leur longueur, elles s'arment, du côté distal, d'épines espacées, basses d'abord, puis robustes et récurvées

vers l'Eponge et disposées suivant une ligne spirale ; enfin, elles renflent leur extrémité libre en un cône à base couronnée de quatre à cinq crochets. C'est dans l'épaisseur de ce cône que se place l'entrecroisement des lignes du filament axial. Ici donc, comme chez *Acaloculyx brucei* et *Malacosaccus coatsi*, l'ancre est un spicule réduit à l'état de monactine.

Les microsclères les plus abondants sont des *oxyhexasters*, pareilles à celles de *Holascus ridleyi* (12, pl. xvii. fig. 8) ; les plus belles mesurent 0·12 mm. de diamètre. Répandues par tout le corps, elles sont sujettes à des variations ; souvent chaque rayon primaire ne porte que deux rayons terminaux ; quelquefois plusieurs rayons demeurent simples ; enfin, il arrive qu'ils se tordent à la façon de ceux de certaines oxyhexasters signalées chez *Holascus ridleyi* (12, pl. xvii. fig. 7), mais cela est exceptionnel.

Les *floricomes*, localisés sur la face externe des plaques, sont nombreux et très beaux, chacun de leurs rayons primaires portant de 9 à 13 rayons secondaires gracieusement recourbés en dehors pour figurer un calice bien épanoui. Ils mesurent généralement 0·1 mm. de diamètre. Leurs rayons terminaux, lisses et non élargis avant la palette, qui n'a pas elle-même plus de 0·004 mm. de largeur, portent au bord de celle-ci, comme chez *Malacosaccus vastus*, 4 ou 5 dents brèves.

Il existe enfin, mais rares, des *discohexasters*. Je n'ai réussi à en découvrir que deux, fort semblables à celles de *Regadrella phœnix* (12, pl. xiii. fig. 3) et mesurant 0·1 mm. de diamètre ; mais l'une n'avait que deux rayons terminaux par rayon principal, tandis que l'autre en portait quatre ou cinq.

Famille Caulophacidæ.

Caulophacus instabilis, Topsent. (Pl. IV. fig. 8 et Pl. VI. fig. 16.)

1910. *Caulophacus instabilis*, Topsent (30, p. 12).

Station 313, 18 mars 1903 ; 62° 10′ lat. S., 41° 20′ long. W. ; profondeur, 1775 brasses.

Le spécimen recueilli par la *Scotia* a été détérioré pendant le dragage à tel point qu'on ne saurait se faire une idée de sa forme primitive : il n'en reste que des lambeaux au bout d'un tronçon de pédoncule. En ce piteux état, il est difficile à déterminer, s'il appartient à une espèce déjà connue, comme à décrire, s'il en représente une nouvelle. Sa spiculation offre, il est vrai, beaucoup de traits de ressemblance avec celle de *Caulophacus elegans* F. E. Schulze, mais, pour oser l'identifier à cette espèce, il faudrait supposer que son corps, en ombrelle bien plus large que celle des spécimens du *Challenger*, a été arraché, à l'exception de quelques lambeaux de sa face inférieure. Cette hypothèse n'est point inadmissible, un pédoncule aussi épais ayant probablement supporté une Eponge de belles dimensions ; cependant, comme il se peut aussi que notre *Caulophacus* ait affecté une forme plus voisine de celle de *C. lotifolium* Ijima, ses caractères extérieurs ne peuvent guère être pris en considération. D'autre part, on ne peut oublier que c'est à l'Est du Japon que le *Challenger* a obtenu les seuls

spécimens connus de *C. elegans*, et, quoique les Hexactinellides jouissent souvent d'une distribution géographique immense, il reste des chances pour que le *Caulophacus* de la *Scotia* soit le type d'une espèce différente. L'étude de la spiculation elle-même ne permet pas non plus d'affirmer qu'il s'agisse de *C. elegans* : les mégasclères superficiels ne sont pas tout-à-fait les mêmes de part et d'autre, et les microsclères dont je prends connaissance ne se trouvent ni par les détails de leur configuration, ni par leur taille, ni par leur nombre relatif, identiques à ceux que F. E. SCHULZE a énumérés et figurés. Tous ces motifs d'hésitation réunis m'ont fait penser qu'il serait raisonnable d'établir, au moins sous réserves, une nouvelle espèce.

Le pédoncule creux, bien plus gros que ceux des *Caulophacus elegans* du *Challenger*, ne se montre pas hispide comme eux. Cela tient, je pense, à ce que le rayon distal de ses spicules autodermiques, au lieu de se développer considérablement, conserve, comme nous le verrons, une longueur médiocre, et j'estime qu'il y a lieu de tenir compte de cette particularité. En même temps que le spécimen photographié, la *Scotia* a encore recueilli cinq fragments de pédoncules, longs de 2 à 6 centimètres, épais de 5 à 9 millimètres. Deux d'entre eux, qui peuvent être mis bout-à-bout, semblent constituer la suite du pédoncule de notre Eponge sur une longueur de plus de 8 centimètres, ce qui donne à ce que l'on possède de cet organe une longueur totale de plus de 12 centimètres. Le morceau qui continue directement la portion supérieure du pédoncule est par en haut large et souple comme elle, puis va s'amincissant et se durcissant ; l'autre morceau, tout-à-fait dur, s'atténue encore par en bas, jusqu'à ne mesurer que 3·5 mm. de diamètre à son extrémité inférieure. Les autres fragments paraissent devoir être attribués à des spécimens différents ; l'un d'eux représente une base de pédoncule, d'abord assez grêle, puis un peu élargie et incrustée de petits cailloux noirs ; fendu en long, il montre sa cavité axiale, qui s'étend presque jusqu'au contact du support.

Les lambeaux de chair ont pour squelette surtout des diactines plus ou moins fasciculées, pas bien longues et assez grêles (0·006 mm. à 0·012 mm.), peu ou point renflées en leur centre et ornées d'épines en leurs deux extrémités, qui sont obtuses ; puis, des hexactines éparses, à actines longues de 1·6 mm., peu pointues et un peu épineuses seulement vers leur terminaison. Les mégasclères superficiels sont des hexactines à rayon distal transformé en pinule ; ce rayon, long de 0·16 mm. à 0·24 mm., se couvre de crochets redressés, serrés, composant une touffe large de 0·06 mm. à 0·075 mm., à sommet obtus ; les autres rayons ne portent que de petites épines, soit sur toute leur étendue, soit seulement dans leur moitié distale ; à peu près égaux entre eux, ils mesurent environ 0·1 mm. de longueur. Au-dessous de ces hexactines viennent de grandes pentactines hypodermiques, à actine proximale plus longue, plus grosse et plus ornée que les quatre autres, chargée de fortes épines sur toute ou sur la majeure partie de sa longueur à partir de son origine, tandis que les autres n'ont que leur pointe seule un peu ornée.

Le long du pédoncule, les diactines deviennent pour la plupart plus grosses et beaucoup plus longues et, dans ses parties solides, contractent de fréquentes unions

entre elles au moyen de synapticules. Les pentactines hypodermiques, au contraire, diminuent beaucoup de taille tout en conservant à leur actine proximale son caractère spécial. Quant aux spicules autodermiques, ils se réduisent assez souvent à l'état de pentactines par atrophie de leur rayon proximal ; leurs rayons tangentiels ne subissent aucun changement et leur rayon distal en pinule ne devient pas sensiblement plus long (0·18 mm. à 0·24 mm.) que celui des hexactines autodermiques de la portion charnue du corps.

Des mégasclères, les spicules autodermiques sont les seuls qui diffèrent un peu de ceux de *C. elegans.* À la surface de la chair (Pl. VI. fig. 16*a*), leur rayon en pinule est moins épais, plus allongé, plus fusiforme, bien plus semblable à celui des mêmes spicules de *C. lotifolium.* Sur le pédoncule, ce rayon devient plus claviforme (Pl. VI. fig. 16*b*), accusant ainsi une tendance qui s'exagère chez *C. lotifolium* ; il n'y atteint jamais les dimensions de 0·75 mm. et plus notées par F. E. Schulze et ne produit par suite point d'hispidation perceptible. Parmi les spicules à pinule, préparés avec des lambeaux de chair, je n'en ai pas trouvé qui parussent représenter une catégorie à part, comparable aux spicules autogastriques des autres *Caulophacus* précités.

Les microsclères sont uniquement des *discohexasters.* Les plus nombreuses sont hexastrales (Pl. VI. fig. 16*c*) : leur diamètre ne dépasse pas 0·14 mm.; chacun de leurs rayons principaux, remarquablement court et large, porte 4 à 6 rayons terminaux, droits, armés d'épines récurvées non serrées, et couronnés d'un large disque à plusieurs dents. Ainsi, sur une discohexaster de 0·12 mm. environ de diamètre, les rayons principaux mesurent à peu près 0·008 mm. de longueur sur 0·012 mm. de largeur, et les terminaux, épais de 0·003 mm., sont longs de 0·05 mm. et surmontés d'un disque large de 0·012 mm. Ni ces dimensions ni le nombre des rayons terminaux sur chaque rayon principal ne concordent avec les détails donnés à propos de *C. elegans* (12, pl. xxv. fig. 6). Contrairement aussi à ce que F. E. Schulze a vu chez cette espèce, les discohexasters hexactinales sont rares ici ; leur taille, supérieure à celle des discohexasters hexastrales, s'élève à 0·155 mm. et 0·21 mm.; leurs rayons simples ont, d'ailleurs, la même grosseur et la même ornementation que ceux des discohexasters hexastrales les mieux développées ; rares aussi se montrent les discohexasters hemi-hexactinales, avec un diamètre atteignant 0·218 mm.

La taille des discohexasters hexastrales varie beaucoup, ainsi d'ailleurs que l'épaisseur de leurs rayons ; on en trouve, par exemple, qui, pour un diamètre de 0·045 mm., ont des rayons terminaux droits, épais de 0·0014 mm., alors que d'autres, qui mesurent encore 0·09 mm. de diamètre, ont leurs rayons terminaux droits aussi mais très grêles, ne dépassant pas 0·0005 mm. d'épaisseur. Jusqu'à un certain degré de gracilité, les rayons paraissent épineux ou tout au moins raboteux ; les plus fins seuls sont peut-être réellement lisses. Mais tous ces intermédiaires m'empêchent de distinguer ici des pachydiscohexasters et des lophodiscohexasters. Le nombre des rayons terminaux n'est jamais supérieur à 5 ou 6 sur chaque rayon principal, si bien que jamais rien ne s'offre de comparable à la belle discohexaster de *C. elegans* figurée par Schulze

(12, pl. xxvi. fig. 2). Enfin, si grêles que soient les rayons de certaines des discohexasters trouvées par moi sur les pédoncules, entre les diactines synapticulées, c'est toujours un groupe de dents récurvées qui les couronne et je n'ai pas trouvé une seule onychaster.

D'une façon générale, les microsclères du *Caulophacus* de la *Scotia* atteignent des dimensions moindres et un moindre degré de complication que ceux des *C. elegans* du *Challenger*.

Caulophacus scotiæ, Topsent. (Pl. II. fig. 1–3 et Pl. VI. fig. 17.)

1910. *Caulophacus scotiæ*, Topsent (30, p. 10).

Station 417, 18 mars 1904 ; 71° 22′ lat. S., 16° 34′ long. W. ; profondeur, 1410 brasses.

Le spécimen type de *Caulophacus scotiæ* est de beaucoup le plus grand des *Caulophacus* connus. Les dimensions qu'il atteint par suite du développement extraordinaire de son pédoncule, le classent même au nombre des Hexactinellides géantes. Sa hauteur totale est de 93 centimètres, dont 85 pour le pédoncule. Contrairement à ce qui, d'après Wilson (31, p. 44), a lieu pour *Caulophacus schulzei*, le corps spongieux est donc tenu fort au-dessus du niveau de la vase abyssale. D'ailleurs, le support devait être ici un objet solide car la partie inférieure de l'Eponge constitue une plaque en cuilleron, longue de 6 centimètres, large de 4, compacte et dure, à bords minces, à face concave unie et d'aspect vitreux. Obliquement sur cette base d'insertion se dresse, disproportionné, le pédoncule proprement dit. Il est remarquablement droit pour sa hauteur et ne présente une ondulation un peu marquée que vers le milieu de sa longueur. Comme chez tous les *Caulophacus*, grêle en bas, il s'épaissit en montant. Il débute sous forme d'une colonne cylindrique de 13 mm. de diamètre. À mi-hauteur, ce diamètre est porté à 20 mm. Au-dessus de son ondulation médiane, le pédoncule se modifie et s'aplatit quelque peu, si bien que, à 4 ou 5 centimètres de la portion spongieuse du corps, là où il atteint sa plus grande épaisseur, il faut considérer à celle-ci deux diamètres, mesurant l'un 37 millimètres et l'autre seulement 24 millimètres. Enfin, il décrit un coude assez brusque pour porter, de même que chez les autres *Caulophacus*, le corps dans une position inclinée. Dans cette dernière région, il conserve un certain degré de compressibilité ; il reste même spongieux, lui aussi, en partie, et, tout en haut, se creuse de canaux dont les orifices apparaissent béants à sa surface. Partout ailleurs, il est rigide et ferme. Sa surface est dépouillée de son revêtement, sauf sur une toute petite étendue, au voisinage du corps, sur la partie convexe de sa courbure supérieure (Pl. II. fig. 3). J'ai pratiqué une entaille dans sa paroi pour m'assurer que son axe est creux ; mais, naturellement, j'ignore l'étendue de sa cavité axiale. Elle ne s'ouvre pas au fond du corps, du moins d'une manière directe, mais il se peut qu'elle communique avec la cavité cloacale par l'intermédiaire des canaux dont le sommet du pédoncule est précisément traversé.

Le corps, mou et sans résistance, à défaut d'une charpente robuste, a pu supporter sans dommages les vicissitudes du dragage. Il affecte la forme d'un gobelet profond

mais taillé sans régularité, ses parois ayant plusieurs plis et son bord ne s'élevant pas tout autour au même niveau ; ajoutons cependant que ce bord, effiloché, n'a nulle part son intégrité. Malgré ces imperfections naturelles et ces détériorations, on peut voir que notre *Caulophacus scotiæ* ne se rapproche par la conformation de sa portion charnue que du minuscule *Caulophacus pipetta* Schulze, originaire comme lui de l'Antarctique. L'épaisseur de ses parois, voisine de 12 millimètres vers le bas, se réduit progressivement par en haut à 2 millimètres à peine ; il est probable que le bord naturel de la coupe était fort mince. La face externe a perdu en majeure partie son revêtement spiculeux et, de ce fait, apparaît fibreuse, avec des orifices béants. Son aspect fibreux et comme peigné est déterminé par les paquets de diactines parallèles qui constituent la spiculation principale du parenchyme. Ses orifices aquifères sont d'une inégalité frappante ; quelques uns mesurent de 5 à 10 millimètres, tandis que la plupart demeurent beaucoup plus petits ; leur distribution semble absolument capricieuse. Dans un vaste pli de la paroi, le revêtement dermique, à l'abri du frottement, est parfaitement conservé : c'est une membrane mince, unie, finement et régulièrement quadrillée, qui passe sans s'interrompre au-devant des orifices et tamise l'eau prête à s'y engager. La face cloacale, mieux protégée, porte au complet son revêtement propre, qui, lui non plus, ne laisse pas d'orifices à nu ; même sans loupe, il apparaît différent du revêtement dermique ; il a plus d'épaisseur que lui et se couvre d'une hispidation facile à percevoir.

Les différences d'aspect entre le revêtement dermique et le revêtement cloacal s'expliquent par celles qui existent entre leurs spicules respectifs et qui, précisément, contribuent beaucoup à caractériser l'espèce. Les spicules dermiques sont des hexactines, à actine proximale longue seulement de 0·14 mm. à 0·16 mm., toujours plus courtes que les tangentielles, lesquelles mesurent couramment 0·23 mm. à 0·24 mm. mais se montrent souvent inégales entre elles (Pl. VI. fig. 17*a*) ; ces cinq actines s'ornent pareillement d'épines médiocres dont le nombre va croissant aux approches de leur extrémité, généralement obtuse ; l'actine distale, en pinule, est de toutes la plus brève (0·07 mm. à 0·11 mm.), mais elle se renfle passablement (0·04 mm. à 0·05 mm.) et se hérisse de fortes épines relevées vers son sommet, que dissimule leur accumulation. On ne connaissait pas encore de *Caulophacus* où les hexactines dermiques eussent ainsi l'actine en pinule beaucoup plus courte que toutes les autres. Ces spicules, chez *C. scotiæ*, sont, on le comprend, dans l'incapacité de déterminer une hispidation appréciable de son revêtement dermique. Ils composent un réseau régulier à mailles rectangulaires ou carrées dont les dimensions restent un peu inférieures à la longueur des actines tangentielles, puisque celles-ci, se correspondant, ne se placent pourtant pas rigoureusement bout à bout, et ce réseau étroit est supporté par un autre réseau à mailles elles-mêmes carrées ou rectangulaires, plus larges (0·44 mm. à 0·56 mm.), dessiné par les actines tangentielles de pentactines hypodermiques.

Les spicules cloacaux ou, comme on dit souvent, gastriques sont des hexactines, peu différentes des précédentes en ce qui concerne leurs actines proximale et tangentielles, mais

tout-à fait remarquables par le développement de leur actine distale, cause de l'hispidation signalée plus haut. Cette actine, en effet, s'allonge ici beaucoup plus que les cinq autres (Pl. VI. fig. 17*b*) et varie entre 0·4 mm. et 0·9 mm. de longueur, la grande taille étant fréquemment atteinte ; elle se renfle, au contraire, assez peu (0·02 mm. à 0·03 mm.) et progressivement s'atténue en une pointe acérée ; des épines assez fortes, incurvées mais non appliquées, l'ornent jusqu'à son extrémité, au voisinage de laquelle, toutefois, on les voit diminuer de hauteur. Ainsi constituées, les hexactines cloacales de *Caulophacus scotiæ* sont comparables aux pentactines cloacales à pinule de *C. arcticus*, *C. latus* et *C. agassizi*, mais elles ne se réduisent qu'assez rarement en pentactines par atrophie de l'actine proximale. Elles s'appuient sur un réseau de pentactines hypogastriques.

Pentactines hypodermiques et hypogastriques sont robustes et se ressemblent. Leur actine proximale, qui l'emporte le plus souvent sur les autres en longueur mais subit à cet égard les variations habituelles, s'orne assez souvent d'épines ou de tubercules, tandis que les tangentielles, droites ou un peu recourbées en dedans, se montrent généralement lisses ; l'actine distale atrophiée ne laisse même pas un tubercule à sa place ; les pointes, surtout du côté dermique, sont obtuses, parfois même arrondies.

Les mégasclères du parenchyme sont, en grande majorité, lâchement fasciculées, des diactines longues, fines (0·007 mm. à 0·01 mm.), à bouts arrondis, un peu renflés et épineux, à centrum peu ou point marqué. Des hexactines lisses s'y ajoutent, surtout dans la profondeur de la chair, mais elles sont trop solitaires, avec des actines trop minces (0·018 mm. à 0·02 mm. à la base) et trop souples, pour constituer à l'Eponge une charpente fondamentale de quelque solidité.

Le pédoncule est fait tout entier de diactines, pour la plupart orientées parallèlement à son grand axe, mais cimentées entre elles à de courts intervalles au moyen de synapticules ; leur taille devient bien un peu supérieure à celle qu'elles prennent communément dans le parenchyme, mais, malgré l'importance de l'organe, les plus grosses d'entre elles n'ont guère plus de 0·03 mm. d'épaisseur : il suffit qu'elles soient abondantes et solidement unies. On les retrouve encore, moins en ordre, toutefois, dans la plaque basilaire. Mais nous savons que la face inférieure de cette plaque présente un aspect tout particulier ; elle le doit à ce qu'il s'y développe, sur une épaisseur variant entre 0·5 mm. et 1 mm., un lacis siliceux serré, à trame mince, à mailles étroites et arrondies. La surface libre du réseau est unie ou pourvue seulement de petits tubercules épars, ce qui explique qu'elle se soit tout d'un bloc détachée du support.

Les microsclères sont tous des *discohexasters*. Les plus nombreuses sont des discohexasters hexactinales (Pl. VI. fig. 17*c*), pareilles à celles des *Caulophacus agassizi*, *C. valdiviæ*, etc., à actines simples, longues de 0·09 mm. à 0·11 mm., épaisses de 0·005 mm. à 0·007 mm. à la base, armées d'épines fortes et récurvées, et couronnées d'un disque de 0·01 mm. de diamètre, à 6 dents. Vers l'extérieur, elles se modifient un peu, devenant un peu plus trapues et acquérant 8 à 9 dents au disque un peu élargi

(0·014 mm.). C'est seulement au-dessous du revêtement dermique de la partie supérieure du pédoncule que j'en ai vu se transformer, en diminuant de taille, en des discohexasters hémihexastrales (Pl. VI. fig. 17*d*) ; leurs actines divisées ont une portion principale lisse et des divisions au nombre de 2 à 4, plus longues, épineuses, avec un disque à 8 ou 9 dents. Là seulement encore, j'ai vu de ces discohexasters régulièrement hexastrales (Pl. VI. fig. 17*e*), portant sur leurs rayons principaux lisses, longs de 0·015 mm., cinq rayons secondaires épineux, longs de 0·04 mm. C'est peut-être enfin une ramification plus riche des spicules de la même catégorie qui produit des discohexasters hexastrales de 0·1 mm. de diamètre, ayant sur chaque rayon principal jusqu'à dix rayons terminaux grêles.

Mais ces dernières se rapporteraient presque aussi naturellement à la catégorie de discohexasters hexastrales que le parenchyme renferme, surtout au voisinage de sa paroi cloacale ; de sorte qu'elles forment comme un terme de passage. Les plus grandes discohexasters du parenchyme ont des rayons longs de 0·165 mm., composées d'une partie principale lisse, longue de 0·065 mm., épaisse de 0·004 mm., et de 6 à 9 divisions terminales, longues de 0·1 mm., minces, raboteuses et couronnées d'un disque denticulé. Leurs rayons principaux sont ainsi généralement un peu plus courts que les terminaux et ces derniers, se recourbant légèrement en dehors, figurent par leur ensemble une longue coupe, étroite en bas et plus ou moins évasée vers le haut (Pl. VI. fig. 17*h*).

Il existe encore une catégorie de discohexasters, abondante surtout le long du pédoncule, au-dessous de son revêtement dermique et, jusqu'en bas, parmi ses diactines synapticulées. Ce sont des spicules de 0·07 mm. à 0·08 mm. de diamètre, à rayons principaux lisses, portant un verticille ou un buisson de 12 à 15 rayons terminaux excessivement grêles, avec un tout petit bouton au sommet (Pl. VI. fig. 17*i* et 17*j*). Il s'en trouve quelques unes, de taille supérieure (0·13 mm.), dont les rayons principaux sont, contrairement à ceux des autres, moitié plus longs que les terminaux (Pl. VI. fig. 17*k*).

Famille Rossellidæ.

Bathydorus levis, F. E. Schulze, var. *ciliatus*, Topsent. (Pl. I. fig. 6 et 7.)

1910. *Bathydorus levis*, F. E. Schulze, var. *ciliatus*, Topsent (30, p. 15).

Station 420, 21 mars 1904 ; 69° 33′ lat. S., 15° 19′ long. W. ; profondeur, 2620 brasses.

Un beau spécimen en entonnoir, haut de 8 centimètres, large de 9 centimètres en haut, à supposer son bord entier et ses parois affaissées jusqu'à se toucher. Il est fixé sur un petit galet par un pied court, lisse et ferme, qui s'est trouvé brisé pendant le voyage au point où il se continuait avec la partie spongieuse du corps. Ce point était d'autant plus fragile que la continuité ne s'opérait entre le pédoncule et la paroi molle que d'un seul côté ; une large ouverture, à bords coupés nettement, naturelle, par

conséquent, occupe la majeure partie du fond de l'entonnoir. La surface du corps est égale et glabre avec des orifices aquifères bien visibles, un peu plus grands sur la face cloacale que sur la face externe. Ce qui fait la beauté et l'interêt de ce spécimen, c'est qu'une magnifique frange de soies, haute de 10 millimètres, orne son rebord. Les deux Eponges du S.W. de la baie du Bengale qui ont servi de types à l'espèce *Bathydorus levis* n'avaient pas de frange du tout. D'autre part, les spécimens de *B. levis spinosus* Wilson, de la côte de Colombie, ont les deux faces munies de prostalia épars.

Station 417, 18 mars 1904 ; 71° 22′ lat. S., 16° 34′ long. W. ; profondeur, 1410 brasses.

Un spécimen en entonnoir mou, haut d'environ 7·5 centimètres, et probablement aussi large, porté par un pied court mais arraché de son support. Il est beaucoup moins bien conservé que le précédent ; notamment, sa partie supérieure est détachée : elle présente aussi une frange mais beaucoup plus courte (3 millimètres) et faite de soies plus fines. Il existe encore (est-ce un hasard ?) une perforation à la naissance du pédoncule, mais son contour n'est pas régulièrement arrêté et son diamètre ne dépasse pas 6 millimètres.

Les stauractines dermiques ont des actines à bouts obtus, longues de 0·06 mm. à 0·1 mm., épaisses de 0·004 mm. à 0·005 mm. à la base. Elles n'ont pas un centre nu comme celles de *Bathydorus levis* type et leurs épines, répandues partout, sont moins fortes que chez *B. levis spinosus*.

Les hexactines gastriques ont des actines finement pointues, longues de 0·08 mm. à 0·09 mm., sauf la distale qui est toujours beaucoup plus longue (0·18 mm. à 0·2 mm.) et armée d'épines ayant le double de la longueur des leurs et relevées vers sa pointe.

Les diactines du corps sont fines (0·01 mm. de diamètre moyen), à renflement médian peu marqué, à bouts en forme de massue allongée et épineuse.

Les pentactines hypodermiques sont lisses, à actines tangentielles un peu recourbées en dedans, longues de 0·43 mm., épaisses de 0·02 mm., à actine proximale droite, longue de 0·66 mm. à 0·92 mm., toutes à bouts légèrement renflés et un peu raboteux. Le long du pédoncule, ces pentactines sont entièrement et assez finement épineuses, avec des actines obtuses, les tangentielles longues de 0·18 mm. à 0·25 mm.

Les soies de la frange du spécimen le mieux conservé ont 0·04 mm. d'épaisseur ; elles sont entièrement lisses et pointues. Celles de l'autre sont des diactines à centrum apparent, pas plus longues que celles du parenchyme mais dressées côte à côte sur le bord aminci du corps, nues sur la majeure partie de leur longueur et notablement plus pointues que d'ordinaire.

Les microsclères, mélange d'oxyhexasters et d'hémioxyhexasters, ont 0·09 mm. à 0·125 mm. de diamètre ; leurs rayons secondaires bien divergents, se montrent raboteux, surtout sur les hémioxyhexasters, où leur épaisseur est toujours un peu plus forte.

L'opération du 18 mars 1904 a encore fourni une grande plaque de ce *Bathydorus*, mais sans pied ni rebord reconnaissable.

Calycosoma validum, F. E. Schulze. (Pl. III. fig. 2 et Pl. VI. fig. 5.)

Station 313, 18 mars 1903; 62° 10′ lat. S., 41° 20′ long. W.; profondeur, 1775 brasses.

L'espèce n'était encore connue que d'après un seul spécimen, recueilli par l'*Albatross* (**14**, p. 27) dans l'Atlantique Nord, au large de la côte du Massachusetts, par 40° 34′ 18″ de latitude N. et 66° 09′ de longitude W.

Par ses spicules superficiels à actine distale développée et armée comme chez les *Caulophacidæ*, le genre *Calycosoma* a de grandes affinités avec deux autres genres de *Rossellidæ*, *Asconema* Saville Kent et *Hyalascus* Ijima; mais la possession de strobiloplumicomes au lieu de discohexasters l'a fait ranger par F. E. Schulze, en dernière analyse (**15**, p. 176), dans la sous-famille des *Lanuginellinæ*, les deux autres genres prenant place dans celle des *Rossellinæ*.

Le spécimen type de *Calycosoma validum*, quoique fort détérioré, se trouvait quand même dans un état qui permit d'en imaginer une restauration: c'était une grande Eponge en coupe, à parois graduellement amincies vers le haut, à pied court et épais, probablement détachée d'un support solide; sa surface portait, à intervalles assez grands, des papilles coniques du sommet desquelles s'échappait une touffe de longues soies.

Il n'eût pas été possible de prendre une aussi bonne idée de l'Eponge sur le matériel de la *Scotia*, qui consiste, en effet, en une demi-douzaine de lambeaux irréguliers, ne dépassant pas 3 millimètres d'épaisseur. Ils proviennent probablement de la partie supérieure d'un échantillon de belles dimensions, que l'engin a déchiré puis roulé dans la vase. Leurs deux faces présentent encore en place leur spiculation superficielle; toutefois les verrues de la face externe se trouvent à peu près dégarnies de leurs soies. Les orifices, de forme ovale, sont bien visibles des deux côtés et la disposition irrégulière des lignes squelettiques se distingue elle-même fort bien, surtout sur la face cloacale. Naturellement, la question reste toujours ouverte de savoir si la coupe possède ou non une frange marginale.

Dans son ensemble, la spiculation du *Calycosoma* de l'Antarctique correspond à la description de celle du *C. validum* de l'Atlantique Nord. Rien à ajouter au sujet des diactines, de leur groupement par faisceaux, de leur union si fréquente au moyen de synapticules, pas plus qu'au sujet des grandes hexactines éparses au milieu de la charpente. Mais j'ai fait, à propos des pentactines hypodermiques, une remarque que Schulze n'a pas consignée: tandis que ceux de ces mégasclères qui se tiennent au-dessous de la surface plane du corps ont leurs quatre actines tangentielles parfaitement droites, ceux qui doublent la surface au niveau des verrues sans en dépasser les contours, réduisent ces mêmes actines en longueur mais surtout les incurvent toujours d'une façon brusque en leur milieu (Pl. VI. fig. 5*d*); chacune de ces actines incurvées ne mesure guère alors que 0·3 mm. en tout, au lieu de 0·7 mm. qu'elle atteint, d'habitude, au bout d'une actine proximale longue de près de 1·5 mm. Les pentactines à actines tangen-

tielles droites existent du côté cloacal, plus clairsemées, toutefois, et un peu plus faibles que du côté externe du corps.

Ce qui m'a le plus embarrassé dans la comparaison des deux *Calycosoma*, ce sont leurs spicules dermiques et gastriques (ou mieux cloacaux). Je n'ai pas retrouvé dans celui de la *Scotia* une seule des pentactines à rayon proximal rudimentaire décrites par SCHULZE (14, pl. iv. fig. 5). En outre, j'ai constaté qu'il n'y existe point d'uniformité dans les hexactines. J'ai bien revu, à peu près dans la taille indiquée, les cloacales demeurant un peu plus grêles que les dermiques, les hexactines à rayon distal en forme de pinule et à rayon proximal plus court que tous les autres (Pl. VI. fig. 5*a*, 5*b*), mais j'ai observé avec surprise que, par places, surtout le long de la face cloacale, elles subissent en grand nombre une modification profonde. Leurs dimensions, dépassant alors la moyenne, s'accroissent souvent d'une manière considérable ; en même temps, leur rayon proximal devient de beaucoup le plus long ; fréquemment leur ornementation s'efface, sauf sur le rayon distal et vers l'extrémité des autres rayons (Pl. VI. fig. 5*c*). Ces hexactines agrandies constituent, par l'agencement de leurs rayons tangentiels, un réseau plus ou moins régulier et assez lâche.

S'il est permis d'expliquer l'absence ici des pentactines à rayon proximal rudimentaire du *Calycosoma* de l'*Albatross* en supposant qu'elles pouvaient, dans cette Eponge, n'être que des malformations résultant d'une tendance individuelle, il est difficile de comprendre pourquoi le *Calycosoma* de la *Scotia* produit en proportion si forte des hexactines de taille si inégale et qui vont jusqu'à acquérir un rayon distal de 0·43 mm. à 0·64 mm., un rayon proximal de 0·77 mm. à 0·9 mm. et des rayons tangentiels de 0·5 mm. de longueur.

J'ai hésité à établir une espèce nouvelle d'après ces particularités. Les microsclères m'ont paru différer trop peu de ceux du type de *Calycosoma validum*. Ce sont aussi des oxyhexasters, très nombreuses partout, avec quelques oxyhexactines et intermédiaires, et des strobiloplumicomes confinés aux deux faces de l'Eponge. Les uns et les autres sont cependant un peu plus grands que dans le type : le diamètre des strobiloplumicomes atteint ici 0·06 mm. et 0·07 mm. et celui des oxyhexasters, qui sont souvent un peu rugueuses, varie entre 0·15 mm. et 0·18 mm. Tout bien considéré, je tiens ces différences pour purement individuelles.

Famille COSCINOPORIDÆ.

Chonelasma sp.

Station 417, 18 mars 1904. 71° 22′ lat. S., 16° 34′ long W.; profondeur, 1410 brasses.

Deux fragments complètement macérés : 1° une base sans support, enroulée en cornet comprimé à parois épaisses de 1 mm. à 2 mm., haute de 30 à 40 mm., longue d'autant, large de 7 mm. à 15 mm., intéressante seulement par une série de quatre trous ronds, de 3·5 mm. à 4 mm. de diamètre, perforés suivant sa hauteur, à une distance de 2 mm.

l'un de l'autre, le long de son bord vertical le plus étroit, au ras de sa surface, et donnant, par un canal de même calibre et assez profond, directement accès dans sa cavité : 2° un morceau de plaque, mince et fragile.

II. S.O. AMPHIDISCOPHORA.

Famille Hyalonematidæ.

Hyalonema sp.

Station 417, 18 mars 1904 ; 71° 22′ lat. S., 16° 34′ long W.; profondeur, 1410 brasses.

Un fragment long de 5 centimètres, composé d'une touffe axiale de grosses soies brisées et d'un revêtement de chair effilochée, épais de quelques millimètres. C'est une portion de la base d'un individu à l'origine de sa touffe fixatrice, avec un peu du bourrelet annulaire encore en place.

La spiculation comprend, en fait de mégasclères : des hexactines et surtout des diactines, lisses et pointues, dans le parenchyme ; des pentactines lisses hypodermiques ; un mélange de tétractines, de triactines et de diactines à bouts renflés et épineux, pareilles à celles de *Hyalonema elegans* (12, pl. xxxi. fig. 15), au niveau du *pad* ; implantées sur le tout, des pentactines dermiques, à pinule long de 0·13 mm. à 0·14 mm., épais de 0·006 mm. à 0·008 mm., armé d'épines relevées, incurvées, hautes de 0·017 mm. environ ; les mêmes pentactines ont des actines tangentielles longues de 0·05 mm. à 0·07 mm. et raboteuses dans leur moitié terminale ; quelques hexactines à pinule se rencontrent parmi les pentactines, n'en différant que par la possession d'une actine proximale de 0·07 mm. de longueur. Les soies fixatrices étaient toutes brisées et je n'ai pas vu de pentactines gastriques.

Les microsclères sont : des oxyhexasters du parenchyme, nombreuses, d'un diamètre de 0·08 mm., à actines lisses constamment et fortement courbées dans leur dernier quart ; des amphidisques de trois catégories, à dents étroites, disposées en cloches parallèlement à la tige. Les petits amphidisques, longs de 0·023 mm. à 0·032 mm., ont une tige noueuse au centre et des ombrelles écartées l'une de l'autre ; les macramphidisques, longs de 0·095 mm. (je n'en ai pas trouvé de plus grands), ont une tige grêle (0·003 mm. à peine), ornée d'épines en outre de sa nodosité médiane, et des ombrelles larges de 0·024 mm. à 0·026 mm., entre lesquelles reste un écart de plus de 0·02 mm ; les mésamphidisques, enfin, longs de 0·06 mm. à 0·07 mm., ont des ombrelles beaucoup plus rapprochées l'une de l'autre.

Par l'ensemble de ses spicules, ce *Hyalonema* se rapproche beaucoup des *H. oviliferum* F. E. Schulze et *H. urna* F. E. Schulze, surtout du premier, en raison de l'abondance de ses oxyhexactines. De tous deux il paraît différer par ses macramphidisques plus petits et par ses pinules plus courts avec épines plus longues ; cependant, je ne puis pas affirmer avoir obtenu la taille la plus grande de ses macramphidisques et

je dois tenir compte de ce que les pentactines dermiques dont j'ai pris les mesures, proviennent du bourrelet annulaire et, par conséquent, ne sont peut-être pas absolument typiques. Ne sachant rien de sa forme et n'étant pas sûr de connaître exactement sa spiculation, j'éviterai d'encombrer la littérature en ajoutant aux *Hyalonema*, déjà si nombreux, une espèce qui serait caractérisée d'une manière insuffisante. A d'autres de la dénommer qui, en possession de spécimens mieux conservés, se trouveront à même de vérifier et de compléter cette description succincte.

TETRACTINELLIDA.

Les expéditions antarctiques ont fourni un nombre remarquablement restreint de *Tetractinellida largo sensu*. La *Belgica* a recueilli seulement une *Carnosa*, que j'ai rapportée à *Placina trilopha* F. E. Schulze, en appelant l'attention sur les différences que presque tous les éléments de sa spiculation présentent avec ceux de la forme méditerranéenne (26, p. 30); Lendenfeld l'a appelée depuis *P. trilopha* F. E. Schulze, subsp. *antarctica* (6, p. 326). La petite collection du *Français* ne renfermait aucune Eponge de ce groupe. Celle du *Gauss* (6) se composait de la *Placina* précitée, en de nombreux exemplaires, d'une proche parente, *Placina monolopha* F. E. Schulze, subsp. *antarctica* Lendl., d'une *Oscarella!* douteuse, de trois *Tetillidæ*, dont deux nouvelles en tant qu'espèces, et d'un nouveau *Tribrachion*. La *Discovery* (3) a obtenu encore bien moins: en tout, quatre espèces de *Tetillidæ* déjà connues, dont deux avec des variétés nouvelles. Quant à la *Scotia*, elle n'a pas rencontré de Tétractinellides du tout dans l'Antarctique et les trois espèces suivantes, déjà plus ou moins connues, proviennent toutes de la limite septentrionale de la région subantarctique, des parages de l'île Gough.

Famille Asterostreptidæ.

Pachastrella monilifera, O. Schmidt.

Station 461, 22 avril 1904, Ile Gough, 40° 20′ lat. S., 9° 56′ 30″ long. W.; profondeur, 100 brasses.

Un spécimen, ou mieux un fragment sans support de cette Eponge, mesurant près de 7 centimètres de longueur, assez uniformément 3·5 centimètres de largeur et 2 centimètres au plus d'épaisseur. Il a été brisé suivant son épaisseur et c'est sa face porifère qui seule a été bien conservée. Celle-ci est lisse, unie, et entièrement revêtue par une *Pœcillastra incrustans* Sollas, épaisse de 1·5 mm. à 2 mm.

Les *oxes*, en faisceaux dirigés pour la plupart perpendiculairement à la surface, mesurent 2 à 3 millimètres de longueur sur 0·015 mm. au plus d'épaisseur.

Les *calthropses* distribués par tout le corps en abondance et sans ordre, sont, comme d'habitude, fort inégaux, leurs actines variant entre 0·035 mm. de longueur sur 0·002 mm. d'épaisseur à la base et 0·6 mm. sur 0·06 mm. Les plus petits demeurent réguliers tandis que les plus grands présentent toutes les déformations dont Sollas a donné des exemples (17, pl. xi. fig. 15–23).

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Les microsclères sont des *microstrongyles* presque constamment centrotylotes, finement rugueux, longs de 0·014 mm., épais de 0·005 mm. au centre, et des *spirasters*, plutôt clairsemées, souvent de forme amphiaster, à tige et à actines très grêles, et mesurant au total de 0·012 mm. à 0·014 mm. de longueur.

Pœcillastra incrustans, Sollas. (Pl. VI. fig. 2.)

Station 461, Ile Gough, 40° 20′ lat. S., 9° 56′ 30″ long. W. Sur l'Eponge précédente.

Sollas a signalé (**17**, p. 105) sur les deux spécimens de *Pachastrella abyssi* (=*P. monilifera*) recueillis par le *Challenger* à Tristan da Cunha, par 110 brasses de profondeur, l'existence d'une *Pœcillastra* qu'il a nommée *P. incrustans*, sans la décrire en détail.

L'Eponge s'étendait en croûte sur la face porifère des spécimens en question et mettait ses canaux en continuité avec les leurs (**17**, pl. x. fig. 15). On trouvait isolément ou par places dans les *Pachastrella* des microxes centrotylotes qui avaient dû lui appartenir.

Il est remarquable que le troisième spécimen de *P. monilifera* qui provienne de ces parages de l'Atlantique, dragué à trois degrés de latitude de plus vers le Sud, et par la même profondeur, porte également ce parasite et que les rapports entre les deux Eponges soient identiques à ceux observés par Sollas.

La *Pœcillastra* forme ici une croûte épaisse de 1·5 mm. à 2 mm. Sur une section d'ensemble, on peut la distinguer de la *Pachastrella* à l'œil nu par sa blancheur un peu plus terne. Son ectosome, parfaitement lisse, ne montre pas de grands orifices. Son choanosome est riche en corbeilles vibratiles du type des *Pœcillastra*, claires, sphériques ou ovales et d'un diamètre de 0·032 mm. à 0·038 mm.

La limite entre les deux Eponges est nette. Un décollement partiel s'opère même généralement sur les coupes fines. Il semble aussi que lorsqu'un canal de la *Pœcillastra* se continue avec un canal de la *Pachastrella*, chacune des Eponges tende d'un diaphragme ou d'un crible la partie qui lui est propre. La face interne de la *Pœcillastra* abonde, comme sa face externe, en microxes tangentiels et l'ectochrote de la *Pachastrella* est chargé de microstrongyles centrotylotes.

Les *oxes* de *Pœcillastra incrustans* sont courbés, pointus, le plus souvent groupés en faisceaux qui s'orientent tangentiellement, en des points variés de l'épaisseur du corps ; ils mesurent de 0·77 mm. de longueur sur 0·008 mm. d'épaisseur à 1·4 mm. sur 0·017 mm. ; ils sont proportionellement plus gros que ceux de la *Pachastrella*.

Les *calthropses* sont enchevêtrés en tous sens entre les deux faces du corps, ce qui est exceptionnel pour une *Pœcillastra*. Ils sont inégaux, mais leur taille s'abaisse en général moins que pour ceux de *Pachastrella monilifera* ; les plus petits, qui ne sont pas nombreux, ont des actines longues de 0·04 mm. ; les actines des plus grands atteignent près de 0·4 mm. de longueur sur 0·045 mm. d'épaisseur à la base. Il s'en rencontre un assez grand nombre qui sont difformes, ce qui augmente encore la ressemblance de ces mégasclères avec ceux de la *Pachastrella* parasitée.

Les *microxes* caractéristiques des *Pœcillastra* existent en quantité considérable par toute l'Eponge, mais surtout, comme il a été dit plus haut, au niveau de ses deux faces. Ils sont pointus, toujours courbes, toujours centrotylotes et raboteux (Pl. VI. fig. 2); ils mesurent de 0·09 mm. à 0·13 mm. de longueur sur 0·003 mm. d'épaisseur. Un fait curieux est qu'il s'en retrouve un certain nombre par endroits dans le corps de la *Pachastrella*; il est difficile de se rendre compte comment ils y sont parvenus. Peut-être faut-il admettre que la *Pœcillastra* en rejette et que ces spicules éliminés peuvent se trouver apportés par l'eau d'inhalation dans la *Pachastrella* au même titre que tous autres corps étrangers, notamment que les tests de Foraminifères, qui y abondent.

Les *spirasters*, enfin, sont nombreuses, transformées rarement en amphiasters mais couramment en métasters; elles ont, en moyenne, une longueur totale de 0·017 mm. avec des actines de 0·005 mm. et très grêles; par exception, quelques métasters ont leurs actines longues de 0·01 mm. à 0·015 mm.

Pœcillastra compressa, (Bowerbank) Sollas, var. *parvistellata*, n. var. (Pl. IV. fig. 1 et 2.)

Station 461, 22 avril 1904, Ile Gough, 40° 20′ lat. S., 9° 56′ 30″ W.; profondeur, 100 brasses.

Je considère le genre *Pœcillastra* de Sollas comme valable car un certain nombre de *Streptastrosa* s'y laissent rapporter sans hésitation et constituent par conséquent un groupe naturel. Lendenfeld a préféré (4, p. 72) le noyer dans le genre *Pachastrella*, prenant celui-ci dans une acception si large qu'il l'a rendu hétérogène, ce qui l'a, d'ailleurs, obligé d'abord à le diviser en sous-genres, puis à reconnaitre (5, p. 237) dans le sous-genre *Pachastrella* l'existence d'une série de formes du type de *P. compressa* (Bowerbank), correspondant précisément au genre *Pœcillastra*. Ces formes, Lendenfeld en a passé quelques unes en revue, s'attachant à caractériser les espèces *P. compressa* (Bowerbank), *P. stylifera* Lendenfeld, *P. crassa* (Bowerbank) et une espèce nouvelle, *P. tenuipilosa*, provenant des dragages de la *Valdivia*. Si *P. crassiuscula* Sollas et *P. tenuilaminaris* Sollas se confondent, comme il le suppose, avec *P. crassa* (Bowerbank), il resterait encore à compter dans le genre *Pœcillastra* *P. schulzei* Sollas, *P. laminaris* Sollas et *P. symbiotica* Topsent.

La *Scotia* a recueilli à l'île Gough une *Pœcillastra* que je ne puis pas distinguer spécifiquement de *P. compressa* car, dépourvue d'oxes dermiques spéciaux, elle présente en abondance des tétractines irrégulières, à clades fortement courbés, et des asters dont les plus faibles imitent fréquemment plus ou moins des amphiasters. Il me parait juste cependant de la tenir pour une variété de cette espèce en raison surtout de la petite taille de ses microsclères.

Il y en a quatre fragments, vraisemblablement détachés d'un même spécimen, qui devait affecter la forme d'une coupe largement évasée. Leur épaisseur, de 8 millimètres, diminue jusqu'à 6 millimètres en leur bord, qui est arrondi. Ils sont tout-à-fait blancs

et lisses. Nettement bifaciaux, ils portent leurs oscules sur la face concave. Oscules et pores sont, d'ailleurs, comme le montre (Pl. IV.) la photographie de deux des fragments, vus l'un (fig. 1) par la face inhalante et l'autre (fig. 2) par la face exhalante, revêtus d'un ectosome continu, mince, criblé d'orifices microscopiques. Les oscules ont environ 0·7 mm. à 1 mm. de diamètre ; leurs intervalles sont percés d'orifices punctiformes. Les pores se distinguent des oscules par leur nombre plus élevé et par leur calibre plus faible ; les canaux qui en partent traversent quelquefois la plaque de part en part pour aboutir à des oscules.

Spiculation.—I. Mégasclères : 1. *Oxes* un peu courbés, longs de 1·8 mm. à 2·2 mm., épais de 0·025 mm. à 0·03 mm. Ils composent la majeure partie de la charpente ; distribués sans ordre dans le choanosome, ils s'entrecroisent encore capricieusement dans l'ectosome mais en y demeurant tangentiels au corps, ce qui laisse l'Eponge parfaitement lisse sur ses deux faces. Ça et là, un de ces oxes tronque l'une de ses extrémités et l'arrondit, se transformant alors en un style véritable. LENDENFELD accorde une certaine importance à l'existence ou à l'absence de ces grands styles chez les espèces qu'il a voulu caractériser. D'après lui (**5**, p. 238), *Pæcillastra compressa* n'en posséderait pas. En réalité, j'en ai trouvé de clairsemés comme ici chez des *P. compressa* de ROSCOFF et je les prends pour des malformations, dont la fréquence varie suivant les individus.

Parmi les oxes robustes, il s'en rencontre de beaucoup plus frêles, qui ne dépassent guère 1 mm. de longueur sur 0·008 mm. d'épaisseur. Ces spicules grêles ne représentent pas une catégorie à part ; ils sont rares par tout le corps, et, comme ils font précisément défaut dans l'ectosome, ils ne sont nullement comparables aux spicules superficiels de *P. crassa* et de *P. tenuipilosa*.

2. *Tétractines* fort variables. Leur forme typique est celle d'orthotriænes à rhabdome n'excédant guère de plus d'un tiers la longueur des clades, soit, par exemple, 0·3 mm. pour 0·19 mm., 0·39 mm. pour 0·245 mm., sur 0·025 mm. d'épaisseur. Mais la plupart sont difformes, réduites à l'état de diænes ou de monænes ; ou bien leurs clades se tronquent, se coudent brusquement ou même se bifurquent ; souvent même, sur les plus réduites d'entre elles, le rhabdome pousse une forte protubérance cladoïde quelque part sur sa longueur. Enfin, quelques unes, dirigeant deux de leurs actines vers le haut et les deux intermédiaires vers le bas, se transforment en calthropses. Presque toutes se placent vers la surface du corps, le cladome appuyé contre la face profonde de l'ectosome ; elles sont surtout abondantes du côté exhalant ou cloacal.

II. Microsclères : 3. *Microxes* droits, fusiformes, raboteux, assez souvent centrotylotes ; ils ont de 0·08 mm. à 0·12 mm., généralement moins de 0·1 mm. de longueur sur 0·003 mm. à 0·0035 mm. d'épaisseur. Ils se distribuent en grand nombre par tout le corps. 4. *Asters.* SOLLAS distinguait chez les *Pæcillastra* des métasters et des spirasters. LENDENFELD, en 1903 (**4**), cite des amphiasters et des spirasters chez *P. compressa* et seulement des spirasters chez les autres espèces. En 1906 (**5**), il reconnait des amphiasters et des métasters à *P. compressa* et rien que des métasters ailleurs. C'est qu'on éprouve un certain embarras à désigner d'un seul

nom des asters aussi variables. En ce qui concerne notre Eponge, elles se tiennent en très grande abondance dans le revêtement des deux faces sous la forme de spirasters grêles à épines nombreuses: quand leurs épines se trouvent en nombre moindre, elles ont une tendance à se disposer en deux groupes opposés rappelant ceux qui caractérisent les amphiasters; enfin, dans l'épaisseur du corps, des asters se rencontrent à épines en petit nombre mais plus fortes et dirigées en tous sens, suivant le type métaster. Ces formes, se reliant les unes aux autres par tous les intermédiaires possibles, il n'existe, en réalité, qu'une seule sorte d'asters, qu'on peut appeler des *métasters* puisqu'elles ne font défaut à cet état chez aucune espèce du genre.

Il est à remarquer que les métasters vraies de *P. compressa* var. *parvistellata* sont relativement peu nombreuses et qu'elles demeurent faibles; elles n'atteignent que 0·016 mm. à 0·023 mm. de longueur et se composent de 3 à 7 épines fines et pointues, longues de 0·007 mm. à 0·01 mm.; les spirasters sont de beaucoup ce qui domine, mais elles demeurent assez courtes (0·01 mm. à 0·013 mm. de longueur pour la plupart, rarement davantage, souvent moins) et portent des épines nombreuses, bacilliformes, si brèves que leur largeur totale varie le plus souvent entre 0·004 mm. et 0·006 mm.; quant aux amphiasters, elles restent clairsemées et ne se montrent qu'exceptionnellement et comme par hasard de type assez pur.

MONAXONIDA.

La collection des Monaxonides de la *Scotia* comprend une trentaine d'espèces, mais il convient d'en faire trois parts d'après leur distribution géographique: les espèces antarctiques, les espèces subantarctiques et une espèce recueillie seule dans une opération hors série.

A l'exception de *Myxilla spongiosa* (Ridley et Dendy) var. *asigmata*, draguée avec des Hexactinellides, le 18 mars 1904, Station 417, auprès de la Terre de Coats, par 1410 brasses de profondeur, les espèces antarctiques proviennent des Orcades du Sud (Station 325) et sont des formes littorales, recueillies par 7 à 10 brasses seulement, pendant le séjour de huit mois fait par la *Scotia*, en 1903, dans la baie qui porte désormais son nom. Dans ce lot se trouvent quatre *Tophon* décrits antérieurement, deux, *I. pluricornis* Tops. et *I. unicornis* Tops., d'après le matériel de la *Belgica*, et deux, *I. spatulatus* Kirkp., et *I. flabellodigitatus* Kirkp., d'après celui de la *Discovery*; puis, une *Mycale*, *M. acerata* Kirkp., déjà rencontrée par la *Discovery*, une *Homaeodictya* du *Français*, *H. setifera* et une *Reniera*, *R. dancoi*, que j'ai fait connaitre en 1901 (26, p. 12) et que KIRKPATRICK a revue (3, p. 53). *Myxilla spongiosa asigmata* étant dans le même cas que *Reniera dancoi* (26, p. 18 et 3, p. 28), il n'y a à mentionner, comme Monaxonides antarctiques nouvelles, que trois espèces, *Gellius arcuarius*, *Petrosia depellens* et *Reniera cylindrica*. Je ne fais pas entrer en ligne de compte des fragments sans valeur appartenant à des *Reniera*.

Les espèces subantarctiques forment elles-mêmes deux lots bien distincts. Le

premier, pris sur le banc de Burdwood, Station 346, et aux îles Falkland, Stations 118 et 349, se compose de treize espèces, dont les sept suivantes sont nouvelles : *Homœodictya verrucosa*, *Mycale pellita*, *Tedania murdochi*, *Lissodendoryx buchanani*, *Clathria toxiprædita*, *Dendoryx nodaspera* et *Raspuxilla phakellina*, la dernière, type d'un genre nouveau, et l'avant-dernière, type d'un genre ancien à dénomination changée. Des six autres espèces, quatre étaient connues du Chili (*Hymeniacidon fernandezi* Thiele), de la Patagonie (*Mycale magellanica* Ridley, *Stylostichon nobile patagonicum* Rdl. et D.) ou de l'Antarctique (*Tedania charcoti* Tops.) ; une cinquième, *Toxochalina robusta* Ridley, avait été découverte à Port-Jackson, puis retrouvée à Bahia ; la sixième n'est pas déterminable même comme genre.

Le deuxième lot de Monaxonides subantarctiques a été obtenu bien loin du premier, dans un dragage par 100 brasses de profondeur, à l'île Gough, Station 461. Il comprend quatre espèces, dont trois nouvelles, *Stylostichon toxiferum*, *Bubaris murrayi* et *Pseudosuberites exalbicans*, celle-ci représentant seule le sous-ordre des *Hadromerina* dans la collection ; la quatrième espèce, *Dictyociona discreta* (Thiele), avait été signalée sur la côte du Chili, mais je la tiens pour le type d'un genre nouveau.

Il me reste, pour terminer cet exposé, à citer une *Cladorhiza* nouvelle, *C. thomsoni*, qui, prise entre l'île Gough et Cape Town, au retour de l'expédition, peut être considérée comme faisant partie de la faune Sud-Africaine.

I. S.O. HADROMERINA.

Famille Suberitidæ.

Pseudosuberites exalbicans, n. sp. (Pl. IV. fig. 5.)

Station 461, 22 avril 1904, Ile Gough, 40° 20′ lat. S., 9° 56′ 30″ long. W. ; profondeur, 100 brasses.

Les six spécimens obtenus permettent de se faire une idée probablement exacte de cette Eponge qui, à certains égards, rappelle sa congénère *Pseudosuberites hyalinus* (Rdl. et D.) Tops.

De dimensions inégales et de formes capricieuses, ils incorporent tous beaucoup de corps étrangers ; mais si les uns se réduisent à une mince couche spongieuse autour d'un conglomérat, d'autres, d'une croissance plus vigoureuse, sont devenus massifs par eux-mêmes. De ces derniers la partie supérieure surtout est spongieuse ; elle est même assez molle et facilement déchirable ; elle émet des lobes arrondis et grêles, en nombre tout-à-fait restreint dans le spécimen figuré, mais qui, parfois, s'allongent, se lobent à leur tour, s'anastomosent avec les voisins et constituent en définitive une ramification irrégulière, à rameaux minces, bosselés et obtus. Nulle part les orifices aquifères ne sont apparents.

L'ectosome est une membrane incolore, translucide, détachable par grands lambeaux et molle, malgré ses spicules de soutien. Ceux-ci se disposent dans son épaisseur en

des faisceaux assez fournis qui, se couchant obliquement, s'y entrecroisent sur divers plans, sans former un réseau véritable. Les faisceaux s'épanouissent en bouquets à leur terminaison, et, comme ils ne sont pas horizontaux, ils percent çà et là la surface générale du corps. Il en résulte pour elle une hispidation lâche, très courte et oblique.

Le choanosome, jaunâtre, est charnu, à charpente halichondrioïde, sans ordre et peu dense.

Les spicules sont des tylostyles à base bien dégagée, pareille à celle des tylostyles de *Terpios fugax* (25, pl. vi. fig. 10), c'est-à-dire le plus souvent cordiforme en coupe optique, quelquefois globuleuse acuminée avec bourrelet annulaire ; leur tige, légèrement courbée, à peine fusiforme, ne dépasse guère en épaisseur la largeur de leur tête ; leur pointe s'effile progressivement. Ils sont inégaux et varient entre 0·13 mm. de longueur sur 0·0045 mm. d'épaisseur et 0·34 mm. sur 0·01 mm.

La forme de ces spicules et leur disposition dans l'ectosome servent à distinguer *Pseudosuberites exalbicans* des *P. sulphureus* (Bean) Tops. et *P. andrewsi* Kirkp. ; leurs dimensions empêchent toute confusion avec *P. hyalinus* (Rdl. et D.) Tops.

II. S.O. HALICHONDRINA.

Famille Axinellidæ.

Hymeniacidon fernandezi, Thiele. (Pl. III. fig. 6.)

1905. *Hymeniacidon fernandezi*, Thiele (20, p. 422).

Station 118, 1er février 1904, Port Stanley, îles Falklands ; profondeur, 6 brasses.

Un spécimen sans support, en croûte épaisse. Je le prendrais volontiers pour un *Hymeniacidon caruncula* Bow., tant pour son aspect que pour sa structure. Mais sa coloration à l'état de vie n'a pas été notée et ses styles, tout en restant de même forme que ceux de *H. caruncula*, sont plus courts qu'eux. Ils ne dépassent pas 0·3 mm. de longueur sur 0·007 mm. d'épaisseur alors que chez des *H. caruncula* de la Manche, ils atteignent 0·43 mm. sur 0·008 mm. On les trouve, d'ailleurs, de taille inégale de part et d'autre dans un même individu.

Comme les variations des styles de *H. caruncula* n'ont pas été étudiées, je crois devoir rapporter l'*Hymeniacidon* de la *Scotia* à l'espèce *H. fernandezi* Thiele, dont les spécimens conservés étaient décolorés aussi. Je fais cependant des réserves au sujet de cette identification car Thiele a relevé des différences de taille entre les spicules de ses *H. fernandezi* plus grandes que celles que je viens d'indiquer entre les styles de l'*Hymeniacidon* de la *Scotia* et ceux de *H. caruncula*. En outre, l'un des *H. fernandezi* possédait des styles pareils à ceux de *H. rubiginosa* Thiele qui, vivante, rappelait *H. caruncula* par sa coloration.

Ne peut-on pas se demander si tout cela n'appartient pas à une seule et même espèce ?

Bubaris murrayi, n. sp. (Pl. III. fig. 1.)

Station 461, 22 avril 1904, Ile Gough, 40° 20′ lat. S., 9° 56′ 30″ long. W.; profondeur, 100 brasses.

Cette Eponge affecte des caractères extérieurs qui la rendent aisément reconnaissable. Les quatre spécimens qui en ont été recueillis ne diffèrent entre eux que par leur taille. Il y en a un de même grosseur que le plus petit de la figure 1, Pl. III., mais le quatrième est le plus volumineux de tous: avec une forme aussi régulière que les autres, il mesure 4 centimètres de hauteur, 4 centimètres d'épaisseur et 5 centimètres de largeur. Tous sont massifs, lobés, à lobes décomposés en de nombreux tubercules vaguement arrondis, inégaux. Tous sont libres de tout support et ne paraissent pas avoir été attachés; ils n'ont donc certainement pas passé par un état encroûtant. Ils sont d'un blanc pur dans l'alcool. Leurs diverses faces se montrent plus ou moins anfractueuses. Les tubercules superficiels demeurent lisses, mais les plus protégés par leur position se hérissent d'une hispidation lâche, assez haute. Entre les tubercules, l'ectosome se tend pellucide et luisant, au-dessus de cavités sous-dermiques spacieuses. Il n'y a pas d'orifices aquifères distincts. La masse est de consistance ferme, peu compressible.

La charpente squelettique n'occupe que l'axe de chaque tubercule sous forme de solides faisceaux de spicules qui divergent pour se terminer en divers points de la surface. Autour de ces faisceaux et entre eux est une chair abondante, en grande partie collenchymatense. Les faisceaux se composent surtout d'*oxes* flexueux unis par de la spongine. Ces spicules, sans dimensions fixes, mesurent comme longueur ordinaire 0·7 mm., mais il en est de plus longs comme aussi de moitié plus courts; de même, ils ont pour la plupart 0·014 mm. d'épaisseur environ, mais il s'en trouve dont l'épaisseur atteint 0·025 mm. Des *styles* lisses peu courbés, non renflés à la base, à pointe mal acérée, les accompagnent mais deviennent surtout nombreux à l'extrémité des faisceaux, s'y disposant en bouquets lâches qui causent l'hispidation de la surface. La longueur de ces styles varie entre 0·5 mm. et 1 mm.; leur épaisseur est celle des oxes les plus gros.

Je dédie cette espèce à l'illustre océanographe écossais, Sir JOHN MURRAY.

Famille PŒCILOSCLERIDÆ.

Sous-famille *Ectyoninæ*.

Genre *Raspaxilla*, n.g.

Ectyoninæ dressées, stipitées, axinelliidiformes. D'un réseau spiculo-fibreux axial rayonnent vers la surface, proches les unes des autres, des colonnes plumeuses. Des styles longs et lisses occupent l'intérieur des fibres et, la pointe tournée en haut, composent aux colonnes un axe grêle; des acanthostyles particuliers, tordus à la base, épineux tout au plus dans leur moitié apicale, hérissent abondamment réseau et colonnes, sur lesquels ils s'appuient obliquement. Au sommet des colonnes, les styles

de leur axe divergent en bouquet et rendent hispide la surface du corps tandis qu'autour d'eux se disposent en faisceau d'autres styles, longs mais ténus. Pas de microsclères.

Raspaxilla phakellina, n.sp. (Pl. I. fig. 4 et Pl. VI. fig. 15.)

Station 346, 1er décembre 1903, Banc de Burdwood, 54° 25′ lat. S., 57° 32′ long. W.; profondeur, 56 brasses.

Un spécimen.

C'est une Eponge dressée, stipitée, ramifiée, à rameaux sensiblement étalés dans un même plan. Son pédicelle est ferme, court, subcylindrique, peu élargi en son point d'attache au support. Ses branches, au contraire, sont souples et aplaties et n'atteignent pas 2 millimètres d'épaisseur. En les regardant par transparence, on aperçoit au milieu des quatre branches primaires une bande sombre qui émane du pédicelle, constitue leur axe, se divise dans les branches secondaires mais progressivement s'y efface. L'individu a une hauteur totale de 67 millimètres et une envergure de 10 centimètres; mais un long séjour dans un flacon trop étroit l'avait un peu enroulé en oublie, de sorte que, sur la photographie (Pl. I. fig. 4), les deux moitiés du corps ne semblent pas pareilles et que les rameaux de droite, vus obliquement et mal au point, paraissent cylindriques. Les deux faces se ressemblent; elles sont hispides et sans orifices apparents; une chair unie, marquée de craquelures, les revêt sur la plus grande partie de leur étendue. Le tout est blanc crême, dans l'alcool.

Le squelette de cette Eponge est très caractéristique. L'axe des branches est un réseau fibro-spiculeux à mailles allongées dans le sens de la hauteur; la spongine, abondante et jaune, le rend très résistant; elle y enveloppe, solitaires et clairsemés, des styles longs, lisses et droits; elle y supporte, appuyés sur ses fibres par leur base, dans une direction plus ou moins oblique, d'abondants acanthostyles de type particulier. Sur l'axe ainsi constitué se dressent, gagnant toutes la périphérie, et fort rapprochées les unes des autres, des colonnes plumeuses dont le centre est occupé par une file assez grêle de styles longs, lisses et droits, la pointe invariablement tournée vers l'extérieur; les acanthostyles précités entourent ces colonnes et, s'y appliquant par leur base, obliquement, la pointe vers la surface du corps, les rendent plumeuses. Au bout de chaque colonne, les styles forment un petit bouquet divergent et rendent la surface hispide. Enfin, autour des styles saillants au dehors, se dispose un faisceau de styles lisses, remarquables par leur longueur et leur gracilité.

Spiculation.—I. Mégasclères: 1. *Styles* lisses (Pl. VI. fig. 15*a*), généralement droits ou à peine courbés, à base ni renflée ni tordue, à pointe terminée en un mucron bref. Les plus superficiels d'entre eux, qui sont aussi les plus longs, atteignent 1·2 mm. à 1·4 mm. sur 0·018 mm. d'épaisseur à la base. Ce sont les spicules principaux de l'Eponge puisqu'ils se trouvent dans l'épaisseur des fibres du réseau axial et qu'ils constituent l'axe des colonnes plumeuses. 2. *Acanthostyles* (Pl. VI. fig. 15*b*), remarquables en ce qu'ils ne portent jamais d'épines dans leur moitié basale; ces épines, qui sont toujours faibles mais serrées, ne manquent jamais complètement sur toute leur

longueur, mais elles deviennent difficiles à voir sur les plus grands d'entre eux tandis qu'elles sont bien apparentes sur ceux de taille moyenne, les ornant souvent sur toute leur moitié distale. Ces spicules sont, en outre, toujours courbés à peu de distance de leur base, souvent fortement, souvent aussi brusquement, et fréquemment assez près de cette base pour que celle-ci forme une crosse. Enfin, il n'est pas rare que la base, destinée à s'implanter dans la spongine, se renfle un peu en une tête de subtylostyle. Leur taille, variable, oscille entre 0·16 mm. sur 0·008 mm. et 0·35 mm. sur 0·018 mm. 3. *Styles* (Pl. VI. fig. 15*c*), à base très simple, à pointe excessivement fine, remarquablement grêles, puisqu'ils mesurent 0·6 mm. de longueur sur 0·002 mm. seulement d'épaisseur. Ils se disposent par douze à quinze autour des styles superficiels qui hérissent le corps, en faisceaux généralement épanouis dans l'épaisseur de l'ectosome.

Pas de microsclères.

Par ses mégasclères épineux, hérissant ses fibres axiales et ses colonnes radiales, l'Eponge se révèle comme une *Ectyonine*. Ses bouquets de styles grêles, par leur nature même comme par leur disposition, rappellent ceux des *Raspailia*. L'absence totale de microsclères accentue le rapprochement. Mais la structure est bien différente de part et d'autre, les *Raspailia* ne formant pas de colonnes plumeuses et n'ayant d'acanthostyles, de type d'ailleurs banal, qu'à titre de complément. Ici, au contraire, les acanthostyles, de forme particulière, constituent de beaucoup la majeure partie du squelette. Le réseau fibro-siliceux reste confiné dans l'axe des branches principales et la charpente se compose surtout de colonnes plumeuses. L'épanouissement en bouquet superficiel des styles qui forment l'axe de ces colonnes est un dernier trait qui distingue les *Raspailia* de l'Eponge de la *Scotia*, type, pour tant de motifs, du genre nouveau *Raspaxilla*.

Genre *Dictyociona*, n.g.

Ectyoninæ à charpente composée d'un réseau fibro-spiculeux serré, à spongine abondante dans la profondeur, puis de plus en plus rare vers la surface. Les mégasclères principaux et les mégasclères hérissants sont des acanthostyles ne différant entre eux que par leurs dimensions; les premiers, plus ou moins complètement enveloppés dans la spongine des parties profondes du squelette, se disposent vers la surface en bouquets qui se touchent; les seconds s'implantent isolément aux nœuds du réseau. Les spicules ectosomiques sont monactinaux. Il y a des microsclères, isochèles et toxes.

Dictyociona discreta, (Thiele). (Pl. III. fig. 5.)

1905. *Microciona discreta*, Thiele (20, p. 447, fig. 65).

Station 461, 22 avril 1904, Ile Gough, 40° 20′ lat. S., 9° 56′ 30″ long. W.; profondeur, 100 brasses.

Un spécimen, blanc dans l'alcool.

Thiele, qui a vu le premier représentant de cette espèce, en a fait une *Microciona*.

Le spécimen de la *Scotia* se compose de 80 à 90 tigelles dressées, cylindriques ou

un peu comprimées, souvent géminées, hautes au plus de 10 millimètres, s'élevant d'une base commune, puis indépendantes, à de rares anastomoses près, sur presque toute leur hauteur. Une membrane pellucide très mince était tendue entre elles à une petite distance au-dessous de leur sommet. Nul orifice aquifère n'était distinct.

Ces tigelles, épaisses de 1 mm. à 1·5 mm., et fermes, ont une structure absolument différente de celle des *Microciona* et caractéristique d'un genre nouveau. Leur squelette ne se compose pas, en effet, de colonnes plumeuses indépendantes et parallèles mais d'un réseau fibro-spiculeux continu.

Dans la partie inférieure des tigelles et suivant leur axe, sur les trois quarts environ de leur hauteur, la spongine est très développée et peut être largement débordante ; mais elle diminue graduellement d'importance vers la périphérie et vers le sommet des tigelles. La charpente est serrée, à mailles losangiques étirées vers la surface. Elle peut s'être constituée au centre de chaque tigelle aux dépens d'un certain nombre de fibres de même valeur que celles des *Microciona*, mais alors de fréquentes anastomoses fibro-spiculeuses les ont unies en un réseau véritable et leur ont fait perdre toute individualité ; en outre, vers la surface et sur une certaine épaisseur, les bouquets spiculeux qui terminent ces colonnes plumeuses, rayonnant tout autour de la tigelle, sont entrés en contact et ont continué le réseau, devenu surtout spiculeux ; la direction que prend la pointe des spicules est assez significative. Les spicules hérissants s'implantent surtout aux points d'entrecroisement des fibres et aux nœuds du réseau plus superficiel. Dans son ensemble, une telle structure donne aux tigelles de l'Eponge de la rigidité et de la ténacité.

Spiculation.—I. Mégasclères : 1. *Subtylostyles* ectosomiques peu nombreux, droits, à pointe courte, à base un peu renflée elliptique et couronnée de quelques épines fort petites ; ils mesurent 0·18 mm à 0·24 mm. de longueur et 0·0043 d'épaisseur au-dessus de la base. 2. *Acanthostyles* choanosomiques longs de 0·21 mm. à 0·28 mm., épais de 0·013 mm. à 0·018 mm. au niveau du cou ; ils ont une base renflée, ornée d'épines nombreuses, généralement obtuses, droites ou un peu recourbées vers la tige ; la première partie de celle-ci est lisse ou ne porte que des épines clairsemées, tandis que sa seconde moitié s'arme d'épines abondantes, robustes et récurvées ; la pointe est acérée et peu épineuse. 3. *Acanthostyles* hérissants, exactement de même type que les précédents, mais toujours sensiblement plus petits, puisqu'ils ne mesurent que 0·09 mm. à 0·12 mm. sur 0·008 mm. au niveau du cou.

II. Microsclères : 4. *Isochèles* nombreux, remarquables par leur exiguité, leur longueur ne dépassant pas 0·008 mm. 5. *Toxes* lisses, clairsemés, fortement arqués, à bouts pointus ; leur envergure atteint 0·07 mm. à 0·08 mm.

Cette spiculation compliquée ressemble à tel point, tant par les détails de conformation que par les dimensions de ses cinq sortes d'éléments, à celle de la *Microciona discreta* de THIELE qu'on ne peut douter avoir affaire à un second individu de l'espèce. THIELE a remarqué que les acanthostyles principaux ne sont pas pareils à ceux des *Microciona*. Ils rappellent les acanthostyles hérissants des *Rhaphidophlus* et de certaines *Clathria*

et me conduisent à rapprocher de ces genres d'Ectyonines le nouveau genre *Dictyociona* ; il s'en distingue, d'ailleurs, aisément par ce fait que mégasclères principaux du choanosome et mégasclères hérissants sont chez lui d'un même modèle.

Clathria toxipraedita, n. sp. (Pl. V. fig. 4 et Pl. VI. fig. 12.)

Station 346, 1ᵉʳ décembre 1903, Banc de Burdwood, 54° 25′ lat. S., 57° 32′ long. W.; profondeur, 56 brasses.

Cette espèce est nettement caractérisée par la possession simultanée d'isochèles de deux sortes et de toxes très abondants, d'une longueur inaccoutumée.

Elle est représentée dans la collection de la *Scotia* par un seul spécimen, blanchâtre, long de 7 centimètres, large de 6 centimètres, épais de 25 millimètres. Il s'est développé sur un côté d'un fragment de polypier rameux, qui devait reposer en long sur le sol. Une *Tedania* a gêné sa croissance mais se trouve en majeure partie enclavée dans sa masse. Quoique massif, il doit être manié avec une certaine précaution, parce qu'il se compose de colonnes dressées, d'inégale grosseur, plutôt grêles, lâchement anastomosées entre elles et fragiles. Ces colonnes, tronquées à leur extrémité libre, aboutissent toutes sensiblement à la même hauteur et se présentent à la surface comme des lobes aplatis ou polygonaux, limités par de profondes crevasses. L'ectosome ne forme pas de membranes détachables.

Spiculation.—I. Mégasclères : 1. *Subtylostyles* ectosomiques, droits, à tête ovale, assez renflée, large de 0·007 mm., ornée en son sommet d'un tout petit nombre d'épines, difficiles à voir ; ils mesurent 0·31 mm. à 0·32 mm. de longueur sur 0·005 mm. d'épaisseur. 2. *Styles* des fibres, lisses, courbés dans leur tiers basilaire, légèrement renflés en tête arrondie à un bout, terminés en pointe brève à l'autre ; relativement gros pour leur longueur, ils mesurent 0·55 mm. à 0·65 mm. sur 0·03 mm. 3. *Acanthostyles* hérissant les fibres, assez clairsemés, généralement droits, entièrement épineux, pointus, à base renflée, longs de 0·1 mm. à 0·155 mm., épais de 0·009 mm. au niveau de la tête et de 0·007 mm. au-dessous d'elle.

II. Microsclères : 4. *Isochèles* palmés, du type des isochèles habituels des *Clathria* (Pl. VI. fig. 12*c*), avec une petite pointe à chaque bout ; ils sont longs de 0·0155 mm., larges de 0·003 mm. et très nombreux. 5. *Isochèles* palmés (Pl. VI. fig. 12*b*), longs de 0·022 mm., larges de 0·007 mm. à 0·008 mm., munis d'un tubercule sur chaque dent et remarquables surtout parce que leur tige avec ses ailes s'arrondit, tandis que leurs deux dents, s'écartant beaucoup en avant d'elle, viennent ou peu s'en faut, au contact l'une de l'autre ; le spicule, vu de profil, affecte la forme d'une navette large de 0·01 mm. en son milieu, à bouts largement émoussés. Ils sont abondants, sans qu'aucun intermédiaire de forme ni de taille existe entre eux et ceux de la catégorie précédente. 6. *Toxes* lisses (Pl. VI. fig. 12*a*), excessivement nombreux et de toutes dimensions, depuis 0·1 mm. d'envergure sur 0·0003 mm. d'épaisseur jusqu'à 1·75 mm. sur 0·007 mm. Leur courbure varie aussi avec leur taille ; en général, elle n'est accusée qu'en leur centre

et leurs deux moitiés se trouvent sur la majeure partie de leur longueur dans le prolongement l'une de l'autre. Les plus grands de ces spicules ne se révèlent comme toxes que par une légère inflexion située en leur milieu ; leurs pointes sont aiguës, mais assez brèves.

Stylostichon toxiferum, n. sp. (Pl. IV. fig. 7 et Pl. VI. fig. 14.)

Station 461, 22 avril 1904, Ile Gough, 40° 20′ lat. S., 9° 56′ 30″ long. W.: profondeur, 100 brasses.

Un spécimen massif, brun clair, très compressible, de dimensions à peu près égales dans tous les sens, développé tout autour d'un caillou qui se trouve maintenant occuper sa base. Il n'a pas d'orifices distincts. Son ectosome, lisse et translucide, se détache avec facilité. Son choanosome a une charpente de longues lignes squelettiques brunes, peu serrées, à structure typique de *Stylostichon*. La coloration générale est due en partie à de la spongine jaune foncé qui renforce les colonnes spiculeuses et en partie à des cellules sphéruleuses brunâtres, très abondantes, grosses de 0·01 mm. à 0·012 mm., à sphérules petites.

Spiculation.—I. Mégasclères : 1. *Tylostyles* composant l'axe des colonnes ; longs de 0·5 mm., lisses, à base assez renflée (0·015 mm.), à tige épaisse (0·012 mm.) et courbée dans son tiers basilaire, à pointe brève, acérée, ils offrent bien l'aspect d'acanthostyles dont les épines se seraient effacées ; quelques uns, d'ailleurs, en conservent un petit nombre sur leur base. Ils se groupent par trois à cinq, de sorte que les colonnes demeurent grêles. La plupart d'entre eux conservent une direction générale ascendante, la pointe tournée vers la surface de l'Eponge, mais il s'en trouve toujours un certain nombre qui s'implantent obliquement sur la fibre par leur base. 2. *Acanthostyles* hérissants des fibres, de forme banale, droits ou peu courbés, à base renflée sans exagération, entièrement couverts d'épines faibles et légèrement récurvées ; ils varient de 0·07 mm. à 0·2 mm. de longueur sur 0·004 mm. à 0·008 mm. d'épaisseur au-dessus de la base ; ils forment un angle très ouvert avec les fibres, sur lesquelles ils s'implantent en grand nombre. 3. *Subtylostyles* ectosomiques, lisses à l'exception de leur base qui, de forme allongée, porte un groupe d'épines toutes petites en son sommet ; cette base est le plus souvent légèrement tordue sur la tige, qui est généralement droite et progressivement effilée, longue de 0·32 mm. à 0·57 mm., épaisse de 0·004 mm. à 0·008 mm. Ces spicules, très abondants à la surface du corps, s'y pressent en bouquets divergents qui s'épanouissent dans l'ectosome et s'y couchent sans déterminer la moindre hispidation.

II. Microsclères : 4. *Toxes* de deux sortes, les uns lisses (Pl. VI. fig. 14), à centre dessinant une courbe ouverte, arrondie, à bouts doucement réfléchis, pointus ; ils mesurent de 0·04 mm. à 0·06 mm. d'envergure, le plus couramment 0·05 mm. et 0·014 mm. d'épaisseur en leur milieu ; les autres plus grands (0·085 mm.) mais toujours bien plus grêles, rugueux vers leurs extrémités. Ce sont les seuls microsclères présents, mais ils existent, les premiers surtout, en abondance.

Stylostichon nobile var. *patagonicum*, (Ridley et Dendy) Topsent.

1887. *Myxilla nobilis* var. *patagonica*, Ridley et Dendy (**11**, p. 142, pl. xxvii. fig. 13).

Station 346, 1er décembre 1903, Banc de Burdwood, 54° 25′ lat. S., 57° 32′ long. W.; profondeur, 56 brasses.

Un spécimen informe, sans support, assez volumineux, car il est long de 95 millimètres, large de 60 millimètres, épais de 35 millimètres. Sa surface, irrégulière, rugueuse, est parcourue par des sillons si nombreux qu'ils la découpent en une infinité de lobules rappelant ceux de *Clathria toxipraedita* (Pl. V. fig. 4), mais plus étroits. Pas d'orifices distincts. Coloration gris foncé. Consistance fragile.

Les caractères de l'ectosome et du choanosome se retrouvent ici tels que Ridley et Dendy les ont décrits. Les fibres squelettiques ne gardent d'individualité que sur une faible longueur, mais, d'après leur existence même, l'Eponge doit être extraite du genre *Myxilla stricto sensu* et rattachée au genre *Stylostichon*.

Ridley et Dendy ont cru remarquer l'existence d'épines sur la tête des tylotes. Leur observation se vérifie aisément dans le spécimen de la *Scotia* : chacun des renflements de ses tylotes se rétrécit pour se terminer par deux toutes petites épines pareilles à un double mucron.

Des sigmates se rencontrent dans mes préparations, mais j'ai tout lieu de supposer qu'ils proviennent de spécimens de *Mycale pellita* conservés avec le *Stylostichon*.

Les mesures des spicules sont sensiblement les mêmes que dans le type, qui provenait du S.W. de la Patagonie.

Genre *Dendoryx*, J. E. Gray (emend.).

Gray, en 1867, a établi le genre *Dendoryx* (**2**, p. 535) avec cette diagnose : "Sponge massive, irregularly reticulated. Spicules of four kinds : 1. Fusiform or cylindrical, pointed at each end, smooth. 2. Needle-like, spinulous all over. 3. Equibianchorate, three-spined at each end. 4. Bihamate." Il y rattachait huit espèces de Bowerbank noyées par leur auteur dans le genre *Halichondria*, et *H. incrustans* Bow., inscrite en tête de la liste, devenait le type du genre *Dendoryx*.

La diagnose écrite par Gray étant tellement vague qu'elle l'avait conduit à grouper des Eponges très différentes les unes des autres, j'ai cherché à plusieurs reprises à la préciser d'après la structure et la spiculation de son type, et je suis arrivé, notammemt en 1892 (**23**, p. 97), à la tracer de la sorte : *Esperellinae* ordinairement sans formes définies ; mégasclères de l'ectosome ordinairement diactinaux (tylotes, strongyles ou tornotes), rarement monactinaux, normalement lisses ; mégasclères du squelette, invariablement styles épineux.

Je faisais remarquer en même temps que les *Dendoryx* se distinguaient des *Myxilla* par l'absence de spicules hérissant la charpente squelettique. Au genre *Dendoryx* ainsi compris se rattachaient des espèces nombreuses.

Mais Thiele, en 1903 (**19**, p. 953), puis Lundbeck, en 1905 (**7**, p. 132), ont objecté que la diagnose précédente convenait au contraire au genre *Myxilla* Schmidt, 1862,

dont l'espèce type était *M. rosacea* Liebk., à squelette réticulé fait d'acanthostyles et non hérissé d'acanthostyles plus petits. LUNDBECK a conservé dans le genre *Myxilla* réduit à cette expression les espèces pourvues d'isancres; il a constitué le genre *Lissodendoryx* Topsent (*emend.*) avec les espèces à isochèles.

Le genre *Myxilla* avait joui à un moment donné, d'une compréhension très large. Ainsi RIDLEY et DENDY (11) appelaient *Myxilla* des Eponges à squelette réticulé d'acanthostyles, non hérissé, comme *M. rosacea*, d'autres à squelette réticulé d'acanthostyles, hérissé, comme *M. mariana*, d'autres encore, à squelette en fibres hérissées, comme *M. nobilis* et *M. frondosa*. Les premières restent dans le genre *Myxilla stricto sensu*; les dernières sont des *Stylostichon*. Que faire des autres?

De la liste des espèces inscrites par GRAY dans son genre *Dendoryx*, la seconde, *D. thompsoni*, est mal connue, mais, à cause des acanthostyles qui sont cités seuls comme mégasclères de son squelette et des styles, indiqués comme mégasclères des membranes, elle doit rentrer dans le genre *Myxilla* au même titre que *D. incrustans*, dont elle a les microsclères, "bidentate, equianchorate," c'est-à-dire les isancres. La troisième espèce, *D. albula*, est une *Grayella*, à moins que, pour elle, on ne tienne, ce que je déplorerais, pour ma part, à faire tomber le genre *Grayella* en synonymie du genre *Dendoryx*. La quatrième, *D. irregularis*, rentre dans la catégorie des Ectyonines à squelette réticulé, telles que *Myxilla mariana*, non encore classées. Je propose de considérer, par conséquent, cette *D. irregularis* (Bow.) Gray comme le type du genre *Dendoryx* Gray, mais pris dans une acception nouvelle; une simple interversion de noms donnera de la sorte satisfaction aux réclamations résultant de la priorité incontestable de *Myxilla* sur *Dendoryx* au sens ou je l'avais pris jusqu'ici.

Les *Dendoryx* seront, d'après cela, des *Ectyoninæ* possédant pour mégasclères ectosomiques des spicules diactinaux (ou pouvant passer pour tels), le plus ordinairement lisses; pour mégasclères choanosomiques des acanthostyles (peut-être à l'occasion des styles lisses ou à épines rares), disposés en un réseau plus ou moins régulier, aux nœuds duquel s'implantent des acanthostyles plus courts, hérissants. Les microsclères sont des isochèles (non pas des isancres), accompagnés ou non de sigmates ou de toxes.

L'Eponge suivante devient pour ces raisons:

Dendoryx nodaspera, n. sp. (Pl. VI. fig. 3.)

Station 346, 1er décembre 1903, Banc de Burdwood, 54° 25′ lat. S., 57° 32′ long. W.; profondeur, 56 brasses.

Cette espèce ressemble beaucoup par sa spiculation à *Dendoryx compressa* (Rdl. et D.) (11, p. 139); mais ses mégasclères sont plus petits, ses sigmates linéaires se contournent rarement et surtout ses isochèles affectent une forme toute différente, plus semblable à celle des mêmes microsclères d'un *Stylostichon* qui lui est sur plus d'un point comparable, *S. repens* Tops. (27, p. 170).

Le spécimen unique qui la représente, embrassant un tube de Serpule, est une petite Eponge massive, grise, assez ferme, longue de 25 millimètres, large de 10 à 20 milli-

mètres, épaisse de 12 millimètres. Sa surface se montre lisse sur une certaine étendue, dans un enfoncement qui paraît être le moule d'un corps étranger car elle est, à ce niveau, dure et imperforée ; partout ailleurs, elle est irrégulière, marquée de petites crevasses sinueuses ou punctiformes ; nulle part elle ne porte d'ectosome distinct. Des cassures mettent à nu l'intérieur, où des canaux aquifères étroits mais nombreux se croisent en tous sens. L'état du spécimen ne permet pas de reconnaître ses oscules.

La charpente choanosomique forme un réseau très net à mailles triangulaires, dont les côtés, où plusieurs acanthostyles peuvent se placer côte à côte, ne mesurent qu'une seule longueur de spicule ; aux nœuds du réseau se dressent un acanthostyle hérissant ou deux, rarement davantage. La densité de ce réseau explique la consistance de la masse. Il ne se dessine pas de fibres, de sorte que le type de structure est très pur. Enfin, comme il n'existe pas de spongine d'union des mégasclères, la charpente demeure assez fragile.

Spiculation.—I. Mégasclères : 1. *Tornotes* ectosomiques droits, peu abondants, épars ; ils ressemblent tout-à-fait à celui qui a été figuré de *Dendoryx compressa* (11, pl. xxvii. fig. 9*c*), car l'un de leurs bouts se renfle et se termine par un mucron ; ils ne mesurent que 0·145 mm. à 0·16 mm. sur 0·004 mm. 2. *Acanthostyles* choanosomiques du réseau, droits ou à peine courbés, courts et épais, assez uniformes, longs de 0·16 mm. à 0·165 mm., épais de 0·009 mm. à 0·01 mm. à la base, sans compter les épines ; ils ont, au contraire de ceux de *D. compressa*, une base toujours renflée, avec des épines fortes et longues qui, avant leur terminaison, se coudent brusquement vers le bas, c'est-à-dire dans la direction de la tige ; celle-ci est entièrement épineuse, sauf en sa pointe, qui est courte et acérée, et ses épines sont hautes, coniques et droites, pas plus serrées que chez *D. compressa.* 3. *Acanthostyles* hérissants, droits, de même type que les précédents et n'en différant que par leurs dimensions et par le fait que les épines de leur tige se retroussent vers leur base ; leur taille est assez uniforme aussi, car ils mesurent 0·075 mm. à 0·083 mm. de longueur sur 0·005 mm. à 0·006 mm. d'épaisseur à la base, sans compter les épines.

II. Microsclères : 4. *Isochèles* abondants, à tige fortement courbée, à ailes et à dents larges, fort inégaux, depuis 0·013 mm. jusqu'à 0·04 mm. de longueur ; les plus grands ont une tige épaisse de 0·004 mm. La figure 3*a* de la planche VI. montre à quel point ils diffèrent des microsclères correspondants de *D. compressa*, dont ils ont pourtant les dimensions. 5. *Sigmates* linéaires, mesurant 0·018 mm. à 0·02 mm. de corde, très nombreux, rarement contournés, le plus souvent arqués dans un plan et très arrondis (Pl. VI. fig. 3*b*).

Des caractères distinctifs trop importants se relèvent entre cette *Dendoryx* du Banc de Burdwood, recueillie par une faible profondeur, et les *D. compressa* qui vivaient par 600 m. à l'embouchure du Rio de la Plata, pour que je me décide à identifier ces Eponges. Pourtant, je ne serais pas surpris que de nouveaux matériaux provenant de localités et de profondeurs intermédiaires diminuassent un jour à nos yeux la valeur de ces différences.

Sous-famille *Myxillinæ*.

Myxilla spongiosa, Ridley et Dendy, var. *asigmata*, Topsent. (Pl. III. fig. 3.)

1901. *Lissodendoryx spongiosa* (Rdl. et D.), var. *asigmata*, Topsent (**26**, p. 18).

Station 417, 18 mars 1904 ; 71° 22′ lat. S., 16° 34′ long. W. ; profondeur, 1410 brasses.

J'ai inscrit, en 1901, cette Eponge dans le genre *Lissodendoryx* à cause de ses styles lisses.

Depuis, Lundbeck a montré (**7**, p. 153) qu'il serait plus naturel de réserver le genre *Lissodendoryx* aux Eponges voisines des *Myxilla* qui possèdent des isochèles au lieu d'isancres ; dans les deux genres ainsi compris, il existe des espèces à styles lisses et d'autres à acanthostyles.

La manière de voir de Lundbeck me paraît d'autant plus acceptable que les styles généralement lisses de certaines formes de *Lissodendoryx*, au sens primitif, peuvent à l'occasion s'orner de quelques épines. L'Eponge en question en offre précisément des exemples.

Il faut donc la rapporter au genre *Myxilla*, à cause de ses microsclères, qui sont des isancres. Mais je la tiens pour une bonne variété de *M. spongiosa* où les sigmates font défaut. Je l'ai rencontrée, en effet, dans les collections de la *Belgica*, du *Français* et de la *Scotia*, recueillie par des profondeurs très différentes et en des points bien éloignés les uns des autres. J'y constate des variations, mais je n'y découvre pas la moindre trace de sigmates. D'autre part, Kirkpatrick (**3**, p. 28) a revu des spécimens de *Myxilla spongiosa* Rdl. et D. ; il a observé des sigmates chez tous, quoique en proportion variable ; il ne dit pas que ces spicules s'y soient trouvés très rares.

La ressemblance des mégasclères de deux sortes et des isancres de *Myxilla spongiosa* et de ceux de ce que j'appelle *M. spongiosa asigmata* est vraiment trop grande pour qu'on puisse regarder cette dernière comme une espèce distincte.

Il s'agit évidemment d'une Eponge polymorphe. Le spécimen qu'en a recueilli la *Scotia* est gris foncé, dressé, comme pédicellé. Son support manque. Sa surface, irrégulière, se couvre d'un ectosome membraneux très mince au travers duquel se voient par transparence de larges orifices, séparés par d'étroites bandes de substance, dont l'ensemble dessine un réseau. L'ectosome est tendu aussi, sur la face qui a été photographiée, au-dessus de longs canaux exhalants superficiels.

Spiculation.—I. Mégasclères : 1. *Tylotes* ectosomiques droits, un peu fusiformes, à bouts un peu renflés et terminés par un faisceau de courtes pointes parallèles, à l'imitation de ceux de *Iophon unicornis* ; ils mesurent 0·375 mm. à 0·4 mm. de longueur sur 0·01 mm. d'épaisseur. 2. *Styles* choanosomiques robustes, courbés, à pointe brève, longs de 0·87 mm. à 0·9 mm., épais de 0·026 mm. à 0·028 mm.

II. Microsclères : 3. *Isancres* abondantes, longues de 0·063 mm. à 0·075 mm.

Si l'on compare les dimensions de ces spicules à celles relevées sur les spécimens de

la *Belgica* et du *Français* et aussi à celles des spicules de *Myxilla spongiosa*, on n'y relève que des différences peu sensibles. Les tylotes sont exactement de la taille de ceux de *Myxilla spongiosa* du *Challenger*. Les styles sont ici un peu plus grands que partout ailleurs mais leur grosseur était souvent atteinte dans le spécimen du *Français*; tout l'intérêt en ce qui les concerne se borne à ce que leur base est quelquefois ornée d'épines à peine distinctes et strictement localisées en son plateau. Les isancres sont grandes à peu près comme celles du spécimen de la *Belgica* ; le nombre de leurs dents reste le plus généralement de trois à chaque bout, mais fréquemment il s'élève à quatre et parfois même à cinq ; cette variation intéressante coïncide avec une disparition absolue des renflements supérieur et inférieur de la tige, qui se montraient cependant avec tant de netteté sur les microsclères de ce même spécimen de la *Belgica* et qui constituaient une ressemblance si intime avec les isancres de *Myxilla spongiosa*. En revanche, la tige de ces microsclères, courbée, est ici épaisse de 0·006 mm. à 0·008 mm., alors qu'elle était plutôt grêle et plus droite sur ceux du spécimen du *Français*.

Lissodendoryx buchanani, n. sp. (Pl. I. fig. 5 et Pl. VI. fig. 7.)

Station 346, 1er décembre 1903, Banc de Burdwood, 54° 25′ lat. S., 57° 32′ long. W.; profondeur, 56 brasses.

Un spécimen.

L'espèce est curieuse à la fois par sa forme et par sa spiculation, aussi me fais-je un plaisir de la dédier à M. BUCHANAN, qui s'est tant intéressé à l'expédition de la *Scotia*.

Le spécimen, obtenu sans son support, se compose de cinq troncs dressés qui se ramifient irrégulièrement à plusieurs degrés et contractent quelques anastomoses entre eux par leurs rameaux. Il est tout blanc dans l'alcool. De consistance ferme, il a une surface lisse, sans orifices distincts.

La charpente choanosomique est faite de bandes spiculo-fibreuses ascendantes, polyspiculées, où la spongine existe en bonne proportion ; des spicules solitaires se répandent sans ordre dans leurs intervalles. Le squelette de l'ectosome consiste en des bouquets dressés, équidistants, de spicules propres.

La structure est certainement un peu spéciale, mais elle est en rapport avec la forme générale du corps ; elle n'empêche pas de rapporter l'espèce au genre *Lissodendoryx*, car il est admissible que la structure des *Lissodendoryx* présente les mêmes variations que celle des *Myxilla*. Ce qui ferait hésiter à placer notre Eponge parmi les *Lissodendoryx* plutôt que parmi les *Dendoricella* Lundbeck, c'est l'aspect diactinal de ses mégasclères choanosomiques, mais je me crois fondé à les prendre pour des spicules monactinaux.

Spiculation.—I. Mégasclères : 1. *Tornotes* ectosomiques, droits, à pointes acérées ; un de leurs bouts est assez souvent un peu plus épais que l'autre, mais sans la moindre trace d'ornementation. Leurs dimensions varient entre 0·415 mm. et 0·46 mm. de longueur sur 0·008 mm. à 0·01 mm. d'épaisseur. Les bouquets qu'ils forment, distants les uns des autres d'environ 0·15 mm., en comprennent une trentaine et s'épanouissent

légèrement du côté distal ; leurs pointes ne dépassent pas ou dépassent à peine la surface générale du corps. 2. *Pseudoxes* choanosomiques (Pl. VI. fig. 7*a*), pas plus gros que les tornotes de l'ectosome mais plus longs qu'eux (0·48 mm. à 0·55 mm.), reconnaissables en outre à ce qu'ils sont toujours courbés ou même flexueux et à ce que leurs extrémités sont dissemblables ; l'une d'elles reste simple, assez brève, souvent précédée à distance d'une inflexion plus ou moins marquée de la tige ; l'autre obtuse, s'orne assez loin de sa terminaison d'une épine courte ou de plusieurs, parfois disposées comme en un verticille ; les épines se placent fréquemment aussi tout au bout de la tige et, par leur ensemble, forment une tête noueuse. Cette ornementation, variable mais constante, semble indiquer que les spicules en question sont réellement des mégasclères monactinaux, des acanthostyles déguisés ; cela est d'autant moins douteux que leur courbure principale s'établit généralement au niveau de leur tiers le plus rapproché de ce qui doit représenter leur base.

II. Microsclères : 3. *Isochèles* (Pl. VI. fig. 7*b*), arqués, abondants, longs de 0·033 mm. à 0·037 mm., à tige épaisse de 0·0045 mm.

Iophon pluricornis, Topsent. (Pl. VI. fig. 9.)

1908. *Iophon pluricornis*, Topsent (28, p. 29).

Station 325, avril 1903 et juin-juillet 1903, Scotia Bay, 60° 43′ 42″ lat. S., 44° 38′ 33″ long. W. ; profondeur, 9 à 10 brasses.

Deux spécimens.

Ce sont deux Eponges amorphes, enlaçant des Algues et des Bryozoaires. L'une d'elles, prise d'abord, plus petite, se fait remarquer par sa teinte assez claire, l'autre étant, comme les spécimens du *Français*, d'un brun noirâtre.

L'espèce est bien reconnaissable à sa spiculation. Ses acanthostyles ont habituellement un certain nombre d'épines à leur base ; quand ils n'en portent qu'une, elle ne se développe pas autant que l'épine unique de *I. unicornis* ou de *I. flabello-digitatus* ; il peut s'en trouver, au moins dans certains spécimens, comme le second provenant de Scotia Bay, qui n'en portent pas du tout et présentent alors une base régulière de styles. Les tylotes, courbés, fusiformes, ont des têtes bien renflées, ornées d'épines qui, généralement, se distribuent sur elles loin en arrière de leur sommet ou même couvrent toute leur surface (Pl. VI. fig. 9*b*), de sorte que, des deux dispositions possibles que j'ai décrites (28), la seconde est réellement typique ; cela est encore un bon caractère pour distinguer *I. pluricornis* des autres *Iophon* de l'Antarctique. Les anisochèles sont de taille inégale et atteignent 0·033 mm. ; l'enroulement des plus petits, que j'ai noté précédemment, paraît être exceptionnel et sans intérêt. Ce qui est plus important, c'est la forme des bipocilles (Pl. VI. fig. 9*a*), qui ont les extrémités en cuilleron, parallèles, tridentées, et ne ressemblent par conséquent pas aux microsclères correspondants de *Iophon flabello-digitatus* ; ces bipocilles sont abondants dans tous les spécimens que j'ai examinés.

Iophon unicornis, Topsent. (Pl. III. fig. 9.)

1908. *Iophon unicornis*, Topsent (28, p. 27).

Station 325, mai, juin, juillet et août 1903, Scotia Bay, 60° 43′ 42″ lat. S., 44° 38′ 33″ long. W. ; profondeur, 9 à 10 brasses.

Plusieurs spécimens, massifs, amorphes, à surface irrégulière, entremêlés d'Algues.

Les acanthostyles possèdent constamment l'épine unique, puissante, droite ou un peu tordue, apicale ou oblique, qui vaut son nom à l'espèce. Les épines des tylotes se localisent sur une sorte de plateau terminal rétréci, de sorte que les extrémités de ces spicules ressemblent un peu à des bourses aux bords froncés ; les deux extrémités d'un même tylote sont souvent un peu inégales mais elles ne sont pas à proprement parler dissemblables. Les anisochèles, extrêmement nombreux, sont de taille assez uniforme (autour de 0·02 mm. de longueur). Je n'ai, en revanche, pas pu découvrir de bipocilles.

Comme on doit s'y attendre, il se produit des variations individuelles dans les dimensions des mégasclères ; ainsi, les tylotes de l'un des spécimens recueillis en mai 1903 atteignent couramment 0·36 mm. de longueur sur 0·012 mm. d'épaisseur.

Iophon spatulatus, Kirkpatrick.

1908. *Iophon spatulatus*, Kirkpatrick (3, p. 29).

Station 325, avril 1903, Scotia Bay ; profondeur, 9 à 10 brasses.

Je rapporte à cette espèce quelques fragments de forme rameuse, à branches cylindracées, translucides, de couleur simplement ambrée. Mais je ne considère pas ma détermination comme certaine parce que je n'ai pas réussi à voir de bipocilles. Ces microsclères, qui, outre les caractères extérieurs, doivent permettre de distinguer de mon *Iophon unicornis* l'espèce décrite peu de temps après par Kirkpatrick sous le nom de *I. spatulatus*, sont, d'ailleurs, déclarés rares par cet auteur. Cela rend difficile à reconnaître *I. spatulatus*, qui pourrait, à tout prendre, n'être pas davantage qu'une variété de *I. unicornis*.

Iophon flabello-digitatus, Kirkpatrick. (Pl. III. fig 7 et 8.)

1908. *Iophon flabello-digitatus*, Kirkpatrick (3, p. 30).

Station 325, mai, juin, juillet et août 1903, Scotia Bay, 60° 43′ 42″ lat. S., 44° 38′ 33″ long. W. ; profondeur, 9 à 10 brasses.

Plusieurs spécimens.

Au lieu de ressembler aux spécimens de la *Discovery* d'après lesquels l'espèce a été nommée, ceux de la *Scotia* sont amorphes et ne se distinguent pas extérieurement des *Iophon unicornis* avec lesquels ils ont été recueillis. Leur coloration, ordinairement foncée, varie d'un individu à l'autre, et il s'en trouve un aussi pâle que les fragments

que j'ai rapportés à *Iophon spatulatus*. Il existe donc, chez cette espèce comme chez beaucoup de Pœcilosclérides, un polymorphisme très accusé.

Les acanthostyles rappellent à s'y méprendre ceux de *Iophon unicornis*; les dimensions indiquées de part et d'autre ne constituent pas une différence réelle entre eux; je leur ai trouvé, par exemple, 0·6 mm. sur 0·015 mm. chez un *I. flabello-digitatus* et 0·415 mm. à 0·43 mm. sur 0·02 mm. chez un autre, tandis que ceux d'un *I. unicornis* me donnaient 0·525 mm. sur 0·018 mm.

Il se produit des variations individuelles semblables dans la taille des tylotes. Ces mégasclères ectosomiques, tels que les a vus Kirkpatrick, offrent une particularité qui, dans une certaine mesure, peut guider la détermination: leurs têtes ne portent d'épines qu'en leur sommet, à la façon de celles des tylotes d'*Iophon unicornis*; seulement, l'une de ces têtes, plus étroite que l'autre, dégage du centre de sa couronne d'épines un fort mucron. Or, ce caractère manque de fixité; présent sur tous les tylotes de certains spécimens, il s'efface sur une partie des mêmes spicules de certains autres et, chez d'autres encore, fait totalement défaut; les tylotes ressemblent alors beaucoup à ceux de *Iophon unicornis*.

Des microsclères, ce sont ces bipocilles que Kirkpatrick a dit spatulés, qui sont le plus caractéristiques; je les ai trouvés nombreux partout et c'est à eux, quand, en même temps, les tylotes étaient mucronés à un bout, que j'ai d'abord reconnu l'espèce. Les grands anisochèles doivent être rares car je n'en ai pas vu; les autres ont la plus grande ressemblance avec ceux de *I. unicornis*.

Tedania murdochi, n. sp. (Pl. V. fig. 5.)

Station 118, 1er février 1904, Stanley, Iles Falklands; profondeur, 6 brasses.

Un magnifique spécimen, debout sur une coquille, dans la position où on le voit figuré. C'est une Eponge gris-jaunâtre, peu fragile, à peine compressible, haute de 12·5 centimètres, large de 6 à 7 centimètres. Une perforation verticale, visible sur la photographie, vers la gauche et un peu au-dessous du milieu de la hauteur, un rameau qui se dirige en avant, à droite en haut, une lame qui fuit en arrière, au bord droit du spécimen, un lobe rampant du même côté, en bas, le long du support, tout cela indique que cette Eponge est de nature rameuse, mais que ses rameaux, épais, se trouvent ici en majeure partie concrescents; ils forment ainsi une lame dressée, pliée le long d'une crête verticale, du sommet de laquelle se détache le rameau précité. Son épaisseur moyenne est, comme celle de ses lobes, d'environ 15 mm.

La surface est unie et d'aspect grenu, parce que les pores, excessivement nombreux, sont de fines perforations de l'ectosome, autour de chacune desquelles se dresse une haie de spicules. Au côté gauche de la figure, l'ectosome est comme usé, ce qui permet de voir la section de beaucoup de canaux inhalants. Des oscules béants, larges de 2 à 4 millimètres, surélevés, à margelle non membraneuse, la parsèment, situés pour la plupart le long des crêtes ou de ce qui correspond au bord supérieur des rameaux. La

chair n'est pas caverneuse. Le squelette, dans le choanosome, forme un réseau dense à mailles étroites, renforcé par de la spongine ; plusieurs styles de front entrent généralement dans sa trame et ses nœuds ne sont pas distants de la longueur d'un spicule. Dans l'ectosome, une bonne partie des mégasclères qui lui sont propres se dressent par faisceaux autour des pores. Il s'y mêle beaucoup de microsclères, orientés comme eux, mais ces fins spicules se rencontrent aussi en abondance dans le choanosome, sans ordre et solitaires.

Les spicules présents sont de même type que ceux de la plupart des *Tedania* connues des mers du Sud : des styles à pointe courte et des tornotes, comme mégasclères, et, pour microsclères, de ces organites caractéristiques qu'on appelle couramment des raphides, mais qu'il me paraît préférable de désigner d'un nom particulier, car ils sont, en réalité, autre chose que de simples raphides. Toujours épineux, d'après Lundbeck (8, p. 5), à épines apprimées, ils ont deux bouts dissemblables ; l'un commence en pointe fine et l'autre se termine brusquement ; les épines qui les couvrent sont récurvées vers la pointe brusque ; au niveau de cette dernière, il y en a un bouquet dont se détache l'une, qui devient plus longue que les autres. Souvent un nodule s'observe à une petite distance de cette extrémité abrégée ; je l'ai considéré comme un centrum dont la situation indiquerait l'atrophie partielle d'une des moitiés du spicule, mais il est à remarquer qu'au delà de cette nodosité, les épines conservent la direction qu'elles ont en deçà d'elle. Ces spicules ne sont pas sans une certaine ressemblance avec les uncinètes des Hexactinellides, et je propose de les appeler des *onychètes*.

Spiculation.—I. Mégasclères : 1. *Styles* du choanosome, lisses, à pointe courte, à base un peu courbée, longs de 0·225 mm. à 0·25 mm., épais de 0·007 mm. à 0·01 mm. 2. *Tornotes* à pointes courtes, ovales, puis brusquement mucronées, comme ceux de *T. charcoti* ou de *T. mucosa* ; ils mesurent environ 0·2 mm. à 0·24 mm. sur 0·0045 mm. à 0·006 mm.

II. Microsclères : 3. *Onychètes* de taille inégale, depuis 0·04 mm. jusqu'à 0·175 mm. Les plus petites sont grêles avec une nodosité voisine de leur bout tronqué ; celles qui ont 0·11 mm. de longueur sont les plus épaisses et mesurent 0·0015 mm. vers leur milieu ; quant aux plus longues, elles ne dépassent guère 0·0012 mm. d'épaisseur et, à partir de 0·14 mm., elles n'ont généralement plus de nodosité distincte. Elles se laissent assez bien répartir en trois groupes, les courtes et fines, les moyennes et grosses et les longues et minces.

Tedania charcoti, Topsent. (Pl. V. fig. 3 et 7.)

1908. *Tedania charcoti*, Topsent (28, p. 30).

Station 346, 1[er] décembre 1903, Banc de Burdwood, 54° 25′ lat. S., 57° 32′ long. W. ; profondeur, 56 brasses.

La *Scotia* a recueilli de cette espèce plusieurs spécimens qui nous la font connaître comme susceptible de varier dans une assez large mesure.

A. Un spécimen massif, volumineux (Pl. V. fig. 7), incomplet, d'ailleurs, sans support et n'ayant sa surface intacte que sur une aire restreinte de 5 centimètres de longueur sur 2·5 centimètres de largeur. Là se retrouvent les caractères extérieurs de l'Eponge du *Français* que j'ai photographiée (28, pl. i. fig. 3), larges oscules à bords membraneux, nervures saillantes à anastomoses fréquentes. La coloration dans l'alcool est gris-jaunâtre uniforme.

La spiculation est calquée sur celle des *T. charcoti* de l'île Booth-Wandel et n'en diffère que par la taille de certains de ses éléments. Les *styles* lisses, doucement courbés vers la base, à pointe courte et épaisse, mesurent 0·58 mm. à 0·625 mm. de longueur sur 0·015 mm. à 0·02 mm. de largeur. Les *tornotes*, légèrement courbés vers l'un des bouts, qui est un tant soit peu plus renflé que l'autre, ont 0·425 mm. à 0·47 mm. sur 0·008 mm. à 0·01 mm. Les petites *onychètes* ont les dimensions habituelles, mais leur nodosité est rarement marquée. Quant aux grandes onychètes, autrement pareilles à celles que j'ai décrites de *T. charcoti*, elles ont plus du double de leur longueur (0·56 mm. à 0·6 mm.) avec une épaisseur proportionnelle (0·003 mm. à 0·004 mm.).

B. Un fragment, long de 55 millimètres, large de 30 millimètres, épais de 5 à 18 millimètres, à surface irrégulière, grisâtre comme le précédent, plus clair cependant sur la cassure.

Ses *styles* ont les dimensions de ceux des *T. charcoti* typiques, soit environ 0·415 mm. sur 0·013 mm. Ses *tornotes* sont à peu près aussi longs que les leurs (0·3 mm. à 0·325 mm.) mais plus minces (0·006 mm.). Ses grandes *onychètes*, de même forme, sont un peu plus grandes et mesurent 0·39 mm. à 0·425 mm. de longueur sur 0·003 mm. d'épaisseur, soit beaucoup moins que les onychètes correspondantes du spécimen précédent. Ses autres onychètes, par contre, restent notablement plus courtes (0·06 mm. à 0·07 mm.) et frappent surtout par leur gracilité, leur tige devenant progressivement linéaire à partir de leur base, qui atteint à peine 0·001 mm. d'épaisseur; leur minceur ne les empêche pas de paraître rugueuses et de présenter une petite nodosité, située comme de coutume.

C. Un spécimen assez gros, massif, tout blanc. Il devait, comme le montre sa face inférieure presque intacte (Pl. V. fig. 3), n'adhérer que faiblement à un support couvert de plaques de Bryozoaires, dont elle a conservé l'empreinte. A la face supérieure, des nervures en relief forment par leurs entrecroisements répétés de faibles élevures ou des crêtes basses.

Les *styles* ont 0·4 mm. à 0·425 mm. sur 0·011 mm. à 0·012 mm.; les *tornotes*, 0·32 mm. sur 0·005 mm. à 0·007 mm.; les grandes *onychètes*, 0·18 mm. à 0·2 mm. sur 0·003 mm.; les petites *onychètes*, 0·06 mm. à 0·07 mm. sur 0·001 mm. à la base, avec une tige linéaire. Ces dernières ressemblent tout-à-fait à celles du spécimen B; les grandes onychètes sont un peu plus courtes mais plus épaisses que celles du type.

D. Un quatrième et dernier spécimen, fragment assez gros, blanchâtre, se rapproche le plus par sa spiculation du spécimen B; ses grandes onychètes mesurent de 0·32 mm. à 0·4 mm. sur 0·0025 mm.

Sous-famille *Mycalinæ*.

Mycale magellanica, (Ridley). (Pl. IV. fig. 4 et Pl. VI. fig. 10.)

1881. *Esperia magellanica*, Ridley (9, p. 117).

Station 346, 1er décembre 1903, Banc de Burdwood, 54° 25′ lat. S., 57° 32′ long. W.; profondeur, 56 brasses.

Quatre spécimens, dont deux en assez bon état pour présenter nettement les caractères extérieurs de l'espèce, tous deux dressés, bosselés, à surface réticulée, et creusés d'une cavité cloacale lisse qui s'ouvre en leur sommet par un large orifice. Les deux autres ne sont que des fragments.

L'un des spécimens et l'un des fragments sont blancs dans l'alcool; le reste est brun. Dans les deux cas, il existe d'abondantes cellules sphéruleuses qui, lorsqu'elles sont arrondies, atteignent 0·02 mm. de diamètre, et dont les sphérules brillantes mesurent de 0·002 mm. à 0·003 mm.; mais celles des individus incolores sont jaune pâle, tandis que celles des individus foncés sont d'un brun noirâtre.

Les mégasclères, *subtylostyles* à tête un peu plus longue, ont ici de 0·32 mm. à 0·57 mm. de longueur et de 0·012 mm. à 0·016 mm. d'épaisseur.

Les *anisochèles* se répartissent assez bien en deux catégories, les uns mesurant de 0·04 mm. à 0·045 mm. et les autres de 0·027 mm. à 0·032 mm. de longueur. Contrairement à ce qu'ont noté Ridley (9), puis Thiele (20, p. 442), ici les trichodragmates existent en abondance. Les *raphides*, fusiformes, varient entre 0·02 mm. et 0·05 mm. de longueur.

Aucun auteur n'a fait mention d'une troisième sorte de microsclères dont j'ai constaté l'existence dans tous les spécimens de la *Scotia*; je veux parler de *sigmates* linéaires, droits ou légèrement tordus à un bout, jamais récurvés (Pl. VI. fig. 10); leur tige, doucement courbée, d'ordinaire, est quelquefois rectiligne comme celle des anisochèles grêles, avec lesquels il est, d'ailleurs, impossible de les confondre; ils mesurent de 0·035 mm. à 0·05 mm. d'envergure. J'ai trouvé, en outre, épars, d'autres sigmates, de taille et de formes diverses, mais ils proviennent sans doute de l'espèce suivante de *Mycale*, qui en est excessivement riche et dont les spécimens ont voyagé mêlés à ceux de *M. magellanica*. N'ayant vu, au contraire, que chez *M. magellanica* les sigmates grêles en question, je suppose qu'ils lui appartiennent bien en propre. S'ils sont constants, leur gracilité expliquerait qu'ils aient pu passer inaperçus.

Mycale acerata, Kirkpatrick. (Pl. V. fig. 6 et Pl. VI. fig. 8.)

1908. *Mycale acerata*, Kirkpatrick (3, p. 36).

Station 325, mai et juin-juillet 1903, Scotia Bay, 60° 43′ 42″ lat. S., 44° 38′ 33″ long. W.; profondeur, 9 à 10 brasses.

Deux fragments assez gros, mais en mauvais état et presque entièrement dépouillés de leur ectosome. Ils ont une teinte brun clair qui paraît due surtout à des cellules sphéruleuses de 0·012 mm. de diamètre, à sphérules petites.

Les mégasclères sont remarquables par leur base modifiée en un mucron, qui rappelle un peu l'épine unique de *Iophon unicornis* mais qui reste droit et se place exactement dans le prolongement de l'axe (Pl. VI. fig. 8). Ils mesurent 0·75 mm. à 0·8 mm. de longueur sur 0·018 mm. à 0·023 mm. d'épaisseur.

Outre les anisochèles de 0·1 mm. et de 0·047 mm. à 0·057 mm., il y en a davantage de 0·03 mm. seulement de longueur dans les deux spécimens de la *Scotia*.

Les raphides, fasciculés, n'ont pas une longueur constante mais varient entre 0·05 mm. et 0·14 mm.

Mycale pellita, n. sp. (Pl. V. fig. 2.)

Station 346, 1er décembre 1903, Banc de Burdwood, 54° 25′ lat. S., 57° 32′ long. W.; profondeur, 56 brasses.

L'espèce est représentée par cinq fragments informes, dont l'un, massif, atteint presque la grosseur du poing. Ils n'ont plus ni base ni surface; pourtant, de grands lambeaux d'ectosome encore en place sur deux d'entre eux, indiquent que l'Eponge se revêt d'une peau spiculeuse, lisse, unie, mince mais comme parcheminée. Le choanosome, ailleurs à nu, a une charpente de fibres très apparentes; elles sont solides et constituent un réseau à mailles larges et irrégulières; elles sont grosses (il en est qui mesurent 1 mm. de diamètre), aussi tranchent-elles sur la chair par leur aspect blanc et brillant: elles diminuent de diamètre aux approches de la surface, mais celles qui supportent l'ectosome sont encore polyspiculées. La chair, toute blanche chez deux des spécimens, est d'un brun plus ou moins foncé chez les autres.

Spiculation.—I. Mégasclères: 1. *Styles* droits ou peu courbés, légèrement fusiformes, à pointe très brève, parfois même atrophiée, de telle sorte que le style se transforme en strongyle; taille ordinaire, 0·45 mm. à 0·5 mm. de longueur sur 0·012 à 0·014 mm. de diamètre.

II. Microsclères. 2. *Anisochèles* palmés, nombreux, en rosettes et solitaires, longs de 0·07 mm., larges de 0·023 mm.; leur dent supérieure, un peu plus courte (0·035 mm.) que les ailes (0·037 mm.), est large dès son point d'attache et a son bord libre droit ou légèrement échancré; leur dent inférieure (la petite dent) a son bord libre large et droit. 3. *Anisochèles* palmés plus petits et épars, longs de 0·04 mm., larges de 0·014 mm., à tige étroite, à dent supérieure ovale, un peu plus longue (0·023 mm.) que les ailes (0·021 mm.), à dent inférieure portant un tout petit mucron au milieu de son bord libre. 4. *Sigmates* très abondants, tordus à un bout ou contournés en S, longs de 0·15 mm. à 0·16 mm., épais de 0·05 mm. à 0·07 mm. 5. *Sigmates* nombreux aussi, tordus à un bout ou contournés en S, longs de 0·038 mm à 0·052 mm., épais de 0·002 mm.

Une peau lisse, mince et ferme, où les styles se serrent tangentiellement, s'y croisant en tous sens ou souvent y formant de larges faisceaux, des fibres choanosomiques robustes, des microsclères très abondants, anisochèles et sigmates, dont on

peut si nettement distinguer deux catégories, tout cela caractérise suffisamment la *Mycale* nouvelle, de forme probablement massive.

Elle est voisine d'une *Mycale* sp. de l'Antarctique, signalée par KIRKPATRICK (3, p. 37), mais qui, possédant des microsclères encore plus grands, n'a, en revanche, pas deux tailles de sigmates. Je lui trouve aussi une certaine ressemblance avec *Mycale porosa* Ridley et Dendy (11), de Port Jackson, mais on ne connaît pas la nature de l'ectosome de celle-ci et ses deux sortes de microsclères sont décrites chacune comme d'une seule catégorie.

Cladorhiza thomsoni, Topsent. (Pl. IV. fig. 6.)

1909. *Cladorhiza thomsoni*, Topsent (29, p. 15).

Station 468, 39° 48′ lat. S., 2° 33′ long. E. ; profondeur 2770 brasses.

C'est en achevant son second voyage que la *Scotia* recueillit cette Eponge. Elle fut envoyée par mégarde avec la collection d'Alcyonaires à M. le professeur J. ARTHUR THOMSON, qui reconnut en elle une Monaxonide, en piteux état mais assez curieuse pour faire de sa part l'objet d'une courte notice (21).

Elle se compose de deux fragments inégaux, qu'une section très nette limite tous deux par en bas, l'un court et gros, mesurant 9 centimètres de longueur et 7·5 mm. de plus grand diamètre, l'autre plutôt grêle, long de 17 centimètres, épais de moins de 4 mm. à sa partie inférieure, puis progressivement aminci vers le haut. Ils apparaissent bien comme des portions d'une même tige mais ils ne sont pas directement superposables ; la différence de grosseur entre le sommet du fragment épais et la base du fragment grêle prouve qu'il manque entre eux une portion probablement assez longue de tige.

Ambrés, vitreux et lisses dans l'alcool, ils deviennent, à sec, blancs, opaques et d'aspect fibreux, à cause de leurs spicules disposés tous en long. Le plus gros est rigide, le plus grêle un peu flexible. Ils portent, implantés suivant plusieurs lignes spirales, qui, de temps en temps, se confondent, des épines relevées vers le haut, toutes incomplètes, vestiges sans doute d'autant de rameaux brisés très près de leur origine. Ce que furent ces rameaux, je ne saurais le dire ; mais je relève à leur propos la phrase suivante de la description de THOMSON : "One of the branches is long, and bifurcates at a distance of 7 cms. from the stem, being continued in two slender divisions (one with a secondary twig) for about 4 cms." Rien de semblable n'existait plus sur l'un ni sur l'autre des fragments qui m'ont été remis.

Au premier abord, ces fragments me parurent absolument décharnés et je m'attendais à n'y plus trouver, comme THOMSON, que des mégasclères. Cependant, me doutant bien qu'il s'agissait non pas d'une Axinellide mais d'une *Cladorhiza* ou d'une *Chondrocladia*, je me mis en devoir d'en râcler la surface, surtout à l'aisselle des épines, avec l'espoir d'y trouver quelques microsclères encore accrochés aux styles superficiels. J'y réussis et j'eus même la chance de détacher un assez grand lambeau de chair à même

lequel je fis plusieurs préparations sans le sacrifier tout entier : j'avais affaire à une *Cladorhiza*, et mieux, dans ce genre, à une espèce nouvelle, dont j'ai fait hommage à M. le professeur J. A. Thomson, qui s'y est intéressé le premier.

Spiculation.—I. Mégasclères. Ce sont tous des *styles*. Le tronc est solide surtout à cause de leur abondance et de la spongine qui les cimente, car ils n'atteignent guère plus de 1 millimètre de longueur. Ils s'y disposent, comme Thomson l'a remarqué, en plusieurs bandes concentriques rappelant sur la coupe les zones d'accroissement du bois dans un tronc d'arbre. Ils s'y placent parallèlement entre eux, suivant le grand axe de l'organe mais sans donner à leur pointe une direction constante.

Ils sont droits, un peu fusiformes, épais de 0·028 mm. en leur centre ; leur pointe est brève, obtuse ; leur base, au contraire, longuement amincie, se termine sans renflement et ne mesure que 0·013 mm. à 0·018 mm. de diamètre.

Dans la chair, les styles décroissent de taille jusqu'à n'avoir plus que 0·5 mm. de longueur sur 0·015 mm., quelquefois moins, de largeur au milieu et que 0·012 mm. à 0·007 mm. de base.

Indépendamment de ces spicules, qui se trouvent en immense majorité et qui, quelles que soient leurs dimensions, appartiennent manifestement au même type que ceux du tronc, il en existe d'autres qu'on serait tenté de considérer comme formant une catégorie de styles à part, tant ils sont grêles et tant leur pointe s'effile ; celle-ci se montre même souvent flexueuse. Pour une longueur de 0·64 mm. à 0·88 mm., ils n'ont que 0·005 mm. de largeur au milieu et seulement 0·002 mm. au niveau de la base. Un rôle spécial leur est peut-être dévolu, mais je l'ignore car leur distribution dans l'Eponge m'échappe.

II. Microsclères. Les *anisancres* unguifères, comme d'habitude excessivement abondantes, ont leur tige ailée seulement sur un tiers de sa longueur et portent cinq dents à chaque extrémité. Elles sont longues de 0·031 mm. à 0·034 mm. ; leur gros bout, vu du face, est large de 0·011 mm. ; leur tige, au-dessous de sa portion ailée, mesure 0·004 mm. d'épaisseur.

De grands *sigmates*, longs de 0·15 mm. environ, épais de 0·008 mm., parsèment la chair en assez grand nombre ; leurs bouts, non tranchants, se recourbent généralement dans un même plan ; je n'en ai pu trouver qu'un seul qui fût tordu ; leur tige, fortement convexe, présente, surtout dans sa portion médiane, une voussure très accentuée.

Quelques microsclères à peu près de même longueur mais plus étroits (0·005 mm.) et minces, à bouts pointus et peu recourbés, contenant de l'air dans leur axe, représentent soit des ancistres incomplets, soit des sigmates mal conformés de la catégorie précédente.

En outre, il y a des *sigmates* petits, à peu près en même quantité que les grands, mais plus difficiles à trouver en raison de leur taille. Ils mesurent 0·05 mm. de longueur et se montrent tantôt droits et tantôt tordus sur leur axe. Leur convexité est régulière et leur concavité me paraît sans encoche.

Je n'ai pas pu reconnaître avec certitude des sigmancistres et je n'ose attacher d'importance à deux grands ancistres (?) qui m'ont semblé crochus seulement à un bout, redressés, au contraire, à l'autre, dans le prolongement de leur axe, en forme de point d'interrogation, mais qui, intriqués parmi d'autres spicules, se prêtaient très mal à l'observation et n'étaient peut-être pas du tout tels que je me le figure.

Homœodictya verrucosa, n. sp. (Pl. V. fig. 1 et Pl. VI. fig. 13.)

Station 346, 1er décembre 1903, Banc de Burdwood, 54° 25′ lat. S., 57° 32′ long. W.; profondeur, 56 brasses.

Un spécimen.

Cette Eponge, qui appartient au genre *Homœodictya* au sens de LUNDBECK (7, p. 117), est proche parente de *H. conulosa* (Rdl. et D.), de *H. setifera* (Tops.) et de *H. spinigera* (Kirkp.), toutes les trois australes, tant par son allure générale que par sa spiculation et, plus particulièrement, par ses isochèles *palmés*.

Le spécimen type, par malheur en mauvais état, a été arraché de son support, déchiré et en majeure partie dépouillé de sa peau. Il se dressait évidemment en une grosse colonne cylindro-conique. Son épaisseur est de 5 à 6 centimètres vers le bas et sa hauteur de 11 centimètres environ. Les lambeaux de peau qui lui restent révèlent un caractère qui distingue de ses congénères précités l'espèce à laquelle il appartient : les lignes ascendantes qui atteignent l'ectosome le dépassent fort peu, sous forme de verrucosités étroites, de 0·5 mm. à 1 mm. à peine de hauteur. Il y a donc ici une membrane superficielle mince, translucide, semée de petites verrucosités. Là où l'ectosome est enlevé, on voit la charpente fibreuse et la chair rétractée. Les fibres sont grosses dans la profondeur et dépassent souvent 0·5 mm. de diamètre ; les plus superficielles atteignent encore 0·14 mm. d'épaisseur. Malgré leur force, elles laissent beaucoup de souplesse au corps parce qu'elles ne se ramifient qu'à d'assez longs intervalles et parce qu'elles ne sont pas serrées. L'Eponge est, en effet, irriguée par de nombreux canaux de 2 à 3 millimètres de diamètre. Elle présente, en outre, en son sommet, deux orifices de 5 à 7 millimètres, deux oscules, sans doute, dont les conduits pénètrent profondément dans sa masse.

Spiculation.—I. Mégasclères : 1. *Oxes*, doucement courbés, longs de 0·52 mm., épais de 0·017 mm. II. Microsclères : 2. *Isochèles* palmés (Pl. VI. fig. 13), longs de 0·027 mm. à 0·037 mm., larges de 0·006 mm., abondants.

Des espèces précitées, c'est de *H. conulosa* (11, p. 106) que *H. verrucosa* se rapproche le plus par la façon dont ses fibres se terminent à la surface, mais c'est à celle de *H. spinigera* (3, p. 39) que sa spiculation ressemble surtout. Ses oxes, un peu plus pointus, sont cependant sensiblement plus faibles, et ses chèles, dont la taille oscille le plus souvent entre 0·03 mm. à 0·035 mm., peuvent être de près d'un tiers plus grands. Dans les deux espèces, les chèles vus de profil montrent une pointe à chaque bout, à l'union de la dent et des ailes ; mais la dent de ceux de *H. verrucosa* forme une courbe

plus prononcée vers la tige avant de rejeter sa pointe au dehors et elle est notablement plus courte (de 0·003 mm. sur les isochèles les plus grands) que les ailes.

Ces détails semblent corroborer l'opinion suggérée par les différences extérieures, à savoir que nous avons affaire à deux espèces distinctes.

Homœodictya setifera, Topsent.

1901. *Desmacidon setifer*, Topsent (26, p. 17).

Station 325, avril 1903, Scotia Bay, 60° 43′ 42″ lat. S., 44° 38′ 33″ long. W.; profondeur, 9 à 10 brasses.

Fragments mêlés à des Algues.

Comme ceux de la collection du *Français*, ils ont une hispidation bien moins longue mais beaucoup plus serrée que celle des spécimens de la *Belgica*. L'un d'eux est brun foncé, rude au toucher, solide; une tubulure osculaire cylindrique se dresse en son milieu, haute et large de 7 millimètres, avec un canal exhalant de 3 millimètres de diamètre. Un autre, sans support, est informe, massif, plus clair et plus mou. S'il s'agit, comme je le pense, toujours de la même espèce, elle est très polymorphe. Je ne saisis pas dans la spiculation de caractères suffisants pour distinguer plusieurs espèces; mégasclères et microsclères ne diffèrent que par la taille. Les oxes ont ici 0·75 mm. à 0·8 mm. de longueur sur 0·023 mm. à 0·026 mm. d'épaisseur; les isochèles palmés ont 0·06 mm. à 0·063 mm. de longueur. Les dimensions des spicules sont donc sensiblement les mêmes que dans les spécimens du *Français*, inférieures à celles des spécimens de la *Belgica*. Mais partout les oxes ont la même forme et partout les isochèles palmés offrent les mêmes détails de conformation: leurs bouts peuvent être dissemblables, ce qui tient sans doute à une légère torsion de leur tige, qui présente l'un de face et l'autre plus ou moins de profil. Le degré de fréquence comme aussi le degré d'amplitude de cette torsion, varient d'un spécimen à l'autre; elle m'a toujours paru très facile à constater.

Desmacidon? sp.? (Pl. IV. fig. 3.)

Station 346, 1er décembre 1903, Banc de Burdwood, 54° 25′ lat. S., 57° 32′ long. W.; profondeur, 56 brasses.

Un fragment, presque entièrement réduit au squelette.

Contrairement à mon espoir de découvrir ses microsclères propres dans les lambeaux membraneux qu'on voit tendus entre les terminaisons de quelques unes des lignes de sa charpente, je n'y ai trouvé que des microsclères étrangers, surtout, en abondance, des anisochèles et des sigmates des *Mycale pellita* conservées dans le même bocal. Il était impossible de tirer parti d'un tel débris d'Eponge. Le genre même en est douteux. Les mégasclères sont des oxes courts et gros (0·26 mm. sur 0·015 mm.), à pointes brèves; ils composent des fibres solides qui peuvent mesurer 0·13 mm. de diamètre.

Famille Haploscleridæ.

Gellius arcuarius, n. sp. (Pl. VI. fig. 11.)

Station 325, juin–juillet 1903, Scotia Bay, 60° 43′ 42″ lat. S., 44° 38′ 33″ long. W.; profondeur, 9 à 10 brasses.

Un fragment d'Eponge sans support, informe, long de 20 millimètres, large de 12 millimètres, épais de 3 millimètres, de teinte sombre, verdâtre, compact, fragile, à orifices indistincts, à surface très finement épineuse, tel est le spécimen, à première vue banal, type de cette espèce.

Pourtant, il est remarquable, d'abord, par sa coloration, due en majeure partie à d'abondantes cellules sphéruleuses sphériques, de 0·017 mm. à 0·023 mm. de diamètre, à sphérules nombreuses, puis par sa spiculation composée exclusivement d'oxes et de toxes.

J'ai déjà fait connaître (**24**, p. 470) un *Gellius*, *G. toxius*, ne possédant que des toxes en fait de microsclères. Thiele, qui l'a retrouvé aux Célèbes, en a figuré les spicules (**18**, pl. v. fig. 16). *G. arcuarius* s'en distingue nettement à la fois par ses *oxes*, qui ont les pointes beaucoup plus allongées et qui mesurent 0·35 mm. à 0·4 mm. de longueur sur 0·012 mm. à 0·015 mm. d'épaisseur, et par ses *toxes*, qui sont beaucoup plus ouverts, relativement plus grêles, à bouts à peine récurvés, et qui, variant entre 0·07 mm. et 0·11 mm. de longueur sur 0·001 mm. à 0·002 mm. d'épaisseur, atteignent communément les plus fortes de ces dimensions.

Toxochalina robusta, Ridley. (Pl. I. fig. 3.)

1884. *Toxochalina robusta*, Ridley (**10**, p. 403).

Station 346, 1er décembre 1903, Banc de Burdwood, 54° 25′ lat. S., 57° 32′ long. W.; profondeur, 56 brasses.

Cette espèce a d'abord été recueillie par l'*Alert* à Port-Jackson, par la faible profondeur de 0 à 5 brasses. Ridley et Dendy ont pensé en avoir retrouvé dans les collections du *Challenger* (**11**, p. 50) un jeune spécimen, provenant des environs de Bahia, par 7 à 20 brasses.

La *Scotia* en a pris deux de belle taille sur le banc de Burdwood, ce qui confirme la vaste dispersion de l'espèce. Leurs caractères de forme et de structure ne laissent pas de doute sur l'exactitude de la détermination. Les plus beaux de leurs *oxes* tornotoïdes mesurent 0·8 mm. de longueur sur 0·006 mm. de largeur ; ils sont donc un peu plus courts mais plus gros que ceux du type. Leurs *toxes* atteignent 0·07 mm. de longueur sur 0·002 mm. d'épaisseur.

Petrosia depellens, n. sp.

Station 325, avril–août 1903, Scotia Bay, 60° 43′ 42″ lat. S., 44° 38′ 33″ long. W.; profondeur, 9 à 10 brasses.

Cette Eponge, dont il a été recueilli à plusieurs reprises, attachés à des Algues, des fragments gros comme des noix, présente des caractères extérieurs qui la rendent assez

facilement reconnaissable. De forme massive, lobée, à surface unie, elle a une coloration brune plus ou moins foncée. Son ectosome, épais de 0·5 mm., forme une écorce à charpente réticulée ; il se détache du choanosome par plaques, avec une facilité telle que le nom spécifique *depellens* lui convient fort bien. Cet ectosome manque en majeure partie sur les spécimens de la collection, et, là où il se trouve encore en place, il ne se perce d'aucun orifice aquifère. Le choanosome mis à nu montre pourtant à sa limite des orifices nombreux, parfois punctiformes mais pour la plupart assez grands, variant de 0·5 mm. à 1·5 mm. de diamètre, distants de 0·7 mm. à 1 mm. et irréguliers de contour.

Le réseau ectosomique est à trame unispiculée assez serrée et sans lignes directrices ; les oxes superficiels dépassent souvent la surface sous un angle variable et lui donnent une fine hispidation, appréciable seulement à la longue.

Le squelette choanosomique est dense, irrégulier, fait d'oxes entrecroisés en tous sens, fréquemment et sans lien de spongine ; des canaux nombreux et plus larges qu'on ne s'attend à les voir d'après leurs orifices, rendent l'Eponge assez caverneuse ; aussi, quoique compacte entre ses voies aquifères, celle-ci est fragile et friable à la façon de *Petrosia friabilis* Topsent (23, p. 69) de l'Atlantique Nord.

Il y a, d'ailleurs, une assez grande ressemblance entre ces espèces. Mais, indépendamment de sa couleur, *P. depellens* se distingue de sa congénère par ses *oxes* de dimensions plus fortes : de forme banale, doucement fusiformes, à pointes acérées, ni longues ni courtes, ces spicules mesurent, en effet, 0·35 mm. à 0·375 mm. de longueur et 0·013 mm. à 0·015 mm. d'épaisseur, tant dans l'ectosome que dans le choanosome.

J'ai constaté l'existence de cellules sphéruleuses brunes, assez grosses, à sphérules de taille médiocre. Enfin, dans un spécimen recueilli au mois d'août, c'est-à-dire en plein hiver antarctique, j'ai trouvé des poches ovariennes bourrées d'œufs en segmentation assez avancée, et rappelant celles que j'ai décrites chez *Reniera simulans* en 1887 (22, p. 103). Il ne s'y était encore développé qu'un très petit nombre de larves sur le point de s'échapper ; je les ai reconnues à leur forme allongée avec arrière rétréci et saillant ; leur ciliation n'était pas visible et l'alcool avait dissous leur pigment, mais un faisceau de spicules était facile à mettre en évidence dans leur partie postérieure.

Reniera cylindrica, n. sp. (Pl. II. fig. 6.)

Station 325, mai et juin-juillet 1903, Scotia Bay, 60° 43′ 42″ lat. S., 44° 38′ 33″ long. W.; profondeur, 9 à 10 brasses.

Il a été recueilli trois spécimens de cette Eponge. Les deux premiers, gris clair dans l'alcool, se dressaient côte à côte, reliés l'un à l'autre seulement par des rameaux de ces Algues dont les entrelacements leur servaient de support. Ils sont simples, malgré leur hauteur de 57 à 75 millimètres, et subcylindriques avec un diamètre d'environ 15 millimètres dans leur tiers supérieur, plus ou moins effilés par le bas, légèrement rétrécis

vers le haut avant de s'y terminer par un bord nettement tronqué. Ce bord forme la marge d'un orifice cloacal circulaire, béant, large de plus de 6 millimètres, donnant accès dans une cavité axiale de même calibre ou peu s'en faut et profonde, car elle dépasse la moitié de la hauteur totale.

La surface du corps, très finement hispide, se perce de pores punctiformes, nombreux et très apparents. Le corps est mou, compressible, fragile même, d'où la cassure que la photographie montre sur chacun des individus en question.

Le troisième spécimen n'est que la partie tubuleuse, haute de 34 millimètres, d'un individu différant des précédents seulement par sa coloration brunâtre.

Le réseau squelettique est faible, lâche et souple, car ses spicules, relativement longs, composent des lignes primaires qui ne comptent pas plus de deux éléments de front, sauf en leur terminaison où ils s'épanouissent en un pinceau grêle, et des lignes secondaires, horizontales, discontinues, unispiculées. Dans chaque direction, ces lignes se tiennent en outre distantes les unes des autres d'environ la longueur d'un oxe, souvent même davantage. Enfin, elles n'ont en leurs nœuds que des liens faibles de spongine incolore.

Les corbeilles vibratiles mesurent 0·05 mm. de grand axe. Il existe dans tous les spécimens des cellules sphéruleuses nombreuses, à sphérules petites; mais ces cellules, incolores et de 0·008 mm. à 0·01 mm. de diamètre dans les individus gris, sont brun clair et grosses de 0·013 mm. dans le fragment brunâtre; toute la chair de ce dernier s'imprègne, d'ailleurs, d'un pigment assez foncé.

Les *oxes* ont de 0·53 mm. à 0·6 mm. de longueur, sur 0·017 mm. d'épaisseur au centre. Ils sont légèrement fusiformes, un peu courbés, à pointes brièvement acérées, ce qui leur fait souvent comme une sorte de mucron conique.

Reniera dancoi, Topsent.

1901. *Reniera dancoi*, Topsent (26, p. 12).

Station 325, avril–août 1903, Scotia Bay, 60° 43′ 42″ lat. S., 44° 38′ 33″ long. W.; profondeur, 9 à 10 brasses.

Plusieurs petits spécimens massifs, blancs, mous, lobés, pourvus d'oscules qui peuvent avoir jusqu'à 3 millimètres de diamètre. Ils sont attachés à des Algues ou à des Bryozoaires.

Les oxes mesurent 0·61 mm. de longueur sur 0·02 mm. d'épaisseur.

Reniera, sp.

Station 325, avril et juin–juillet 1903, Scotia Bay, 60° 43′ 42″ lat. S., 44° 38′ 33″ long. W.; profondeur, 9 à 10 brasses.

Il en a été recueilli cinq ou six fragments que je n'ai pas réussi à déterminer et qui sont trop petits, en trop mauvais état et trop dénués de caractères marquants pour servir de types à de nouvelles espèces.

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Topsent : Spongiaires de la "Scotia"—Planche I.

Fig 1

Fig 3

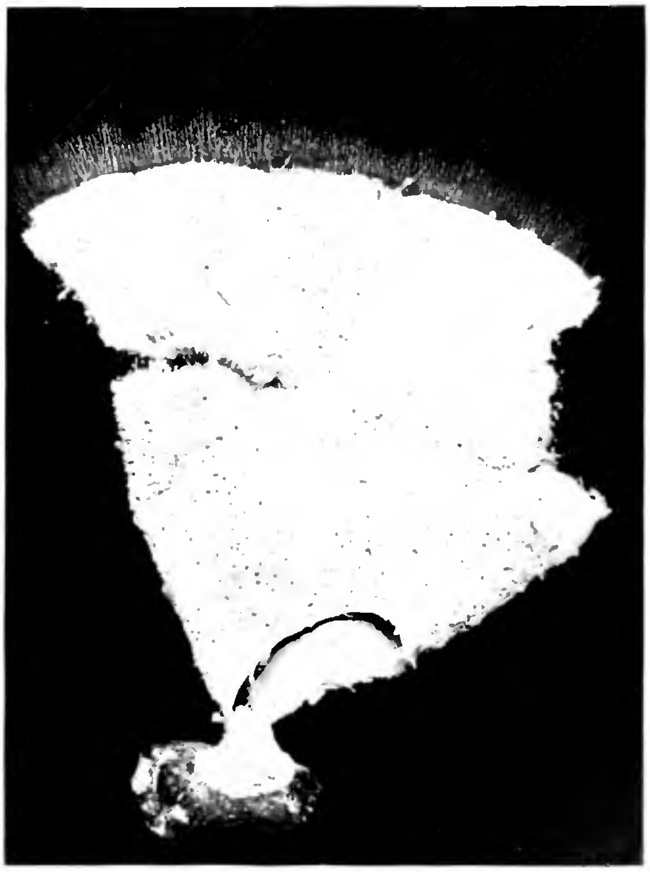
Fig 4

Fig 2

Fig 5

Fig 6

Fig 7



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Topsent : Spongiaires de la "Scotia" Planche II.

Fig. 1

Fig 2

Fig 4

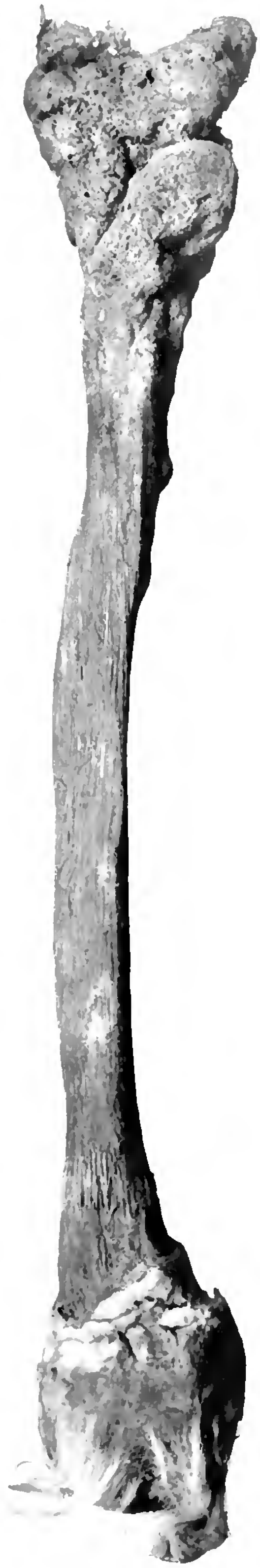

Fig 5

Fig 3

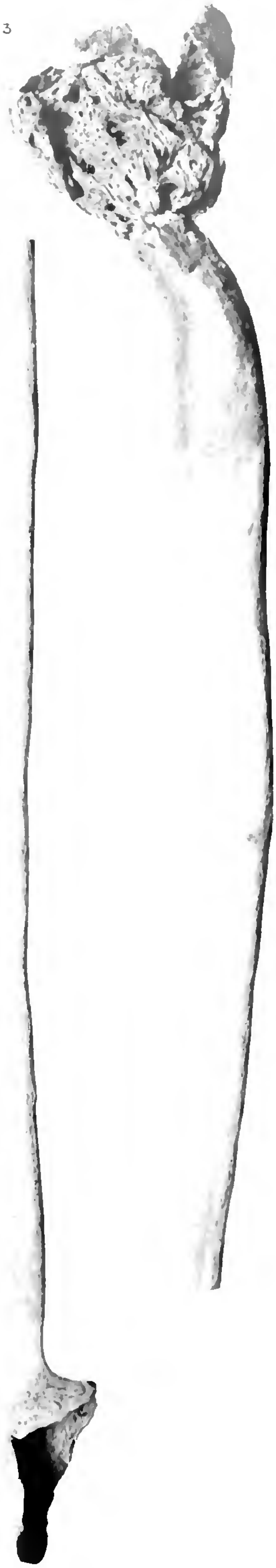

Fig 6

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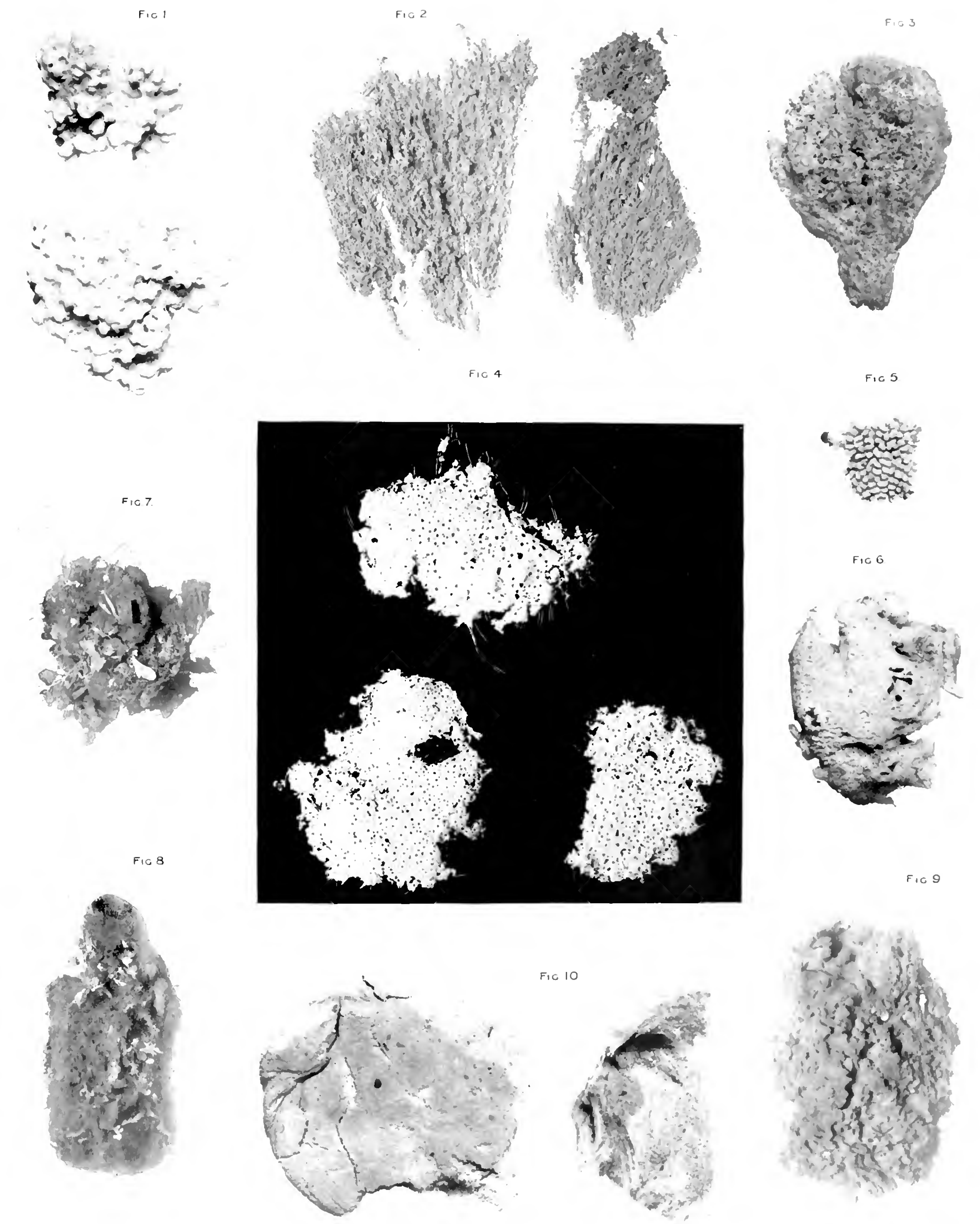
Topsent: Spongiaires de la "Scotia"—Planche III.



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Topsent : Spongiaires de la "Scotia"—Planche IV.

Fig. 1

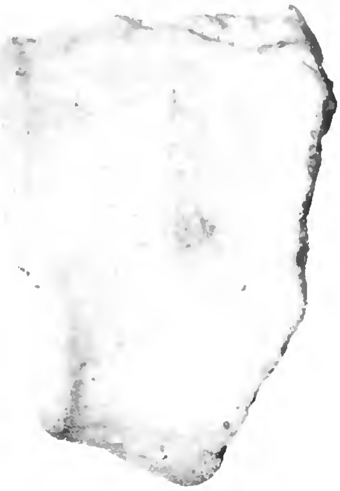

Fig. 3

Fig. 2

Fig. 5

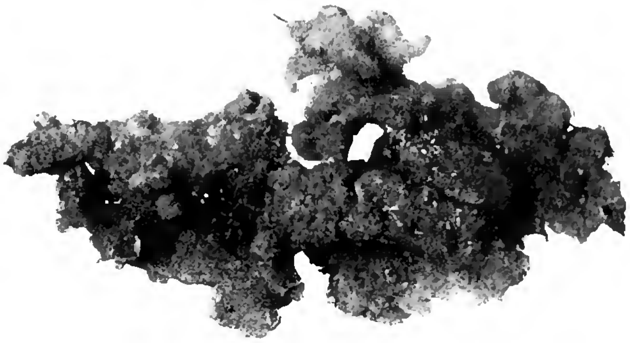

Fig. 4

Fig. 8

Fig. 6

Fig. 7

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Topsent: Spongiaires de la "Scotia" Planche V.

Fig 1

Fig 2

Fig 3

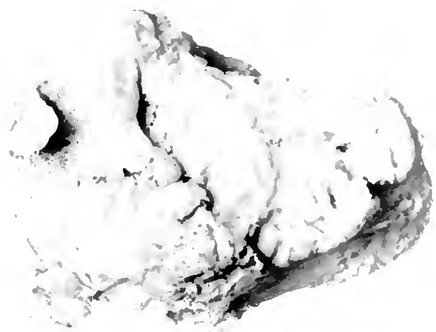

Fig 4

Fig 5

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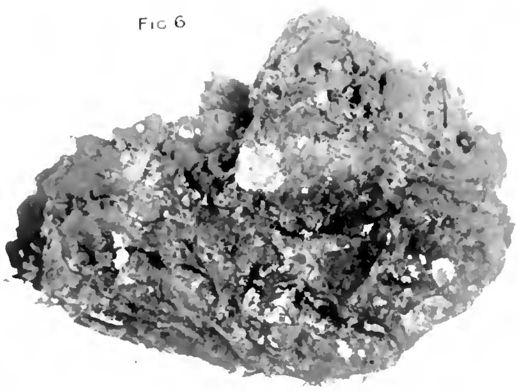
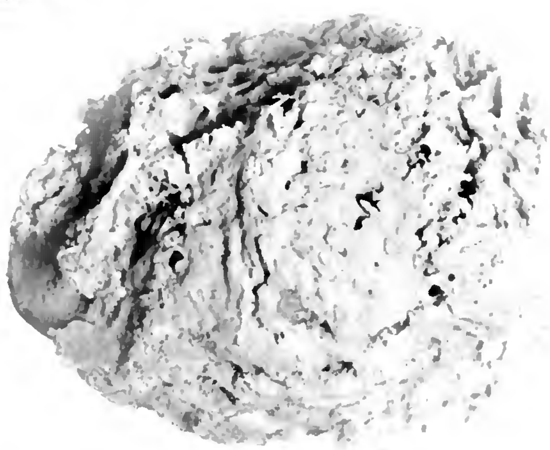


Fig 7



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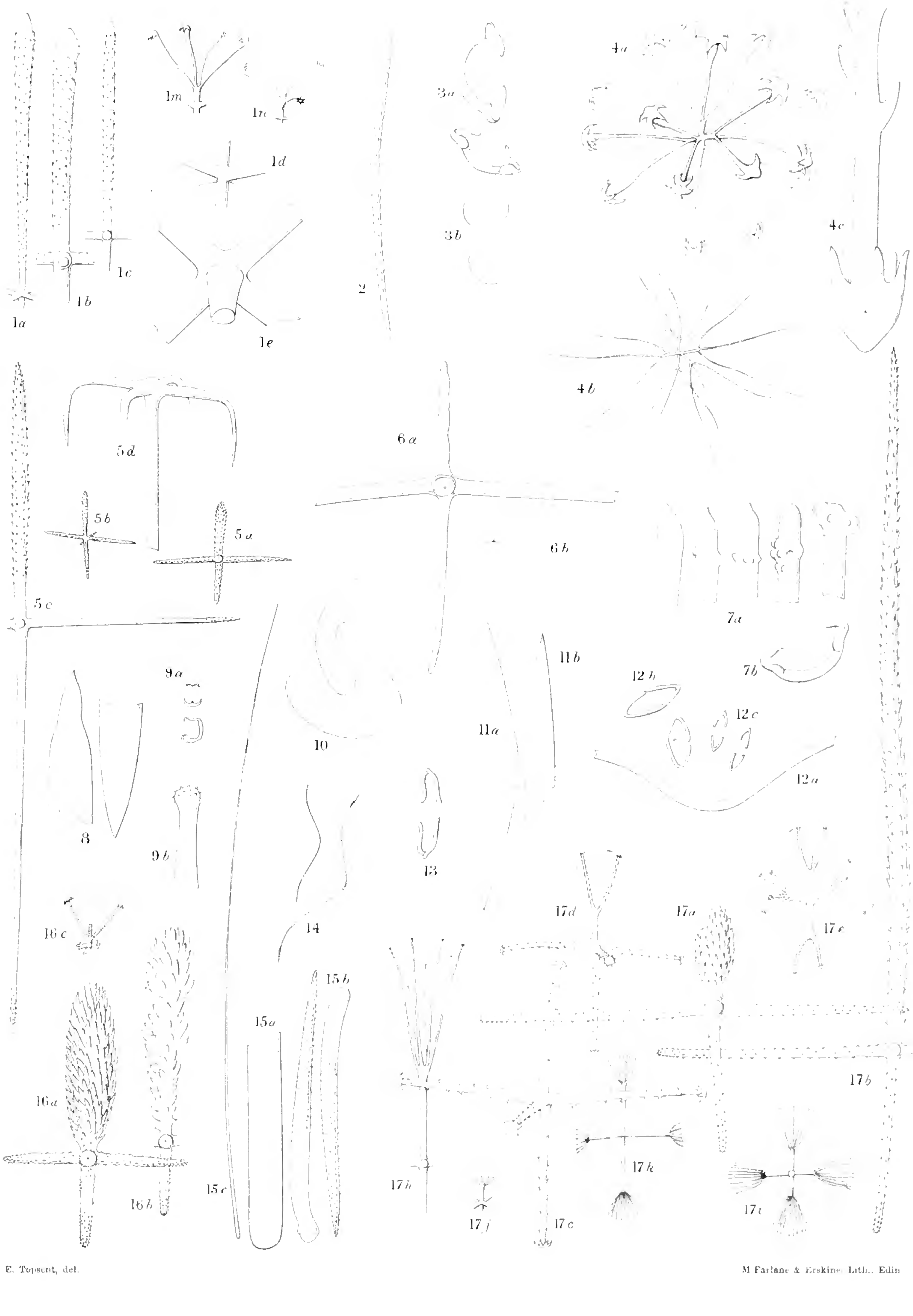
Topsent : Spongiaires de la "Scotia"—Planche VI.



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PART II.

SIPHONOPHORES.

II.—THE SIPHONOPHORA OF THE SCOTTISH NATIONAL ANTARCTIC EXPEDITION.

BY

J. H. KOEPPERN,

Zoological Department, University of Edinburgh.

(WITH THREE TEXT ILLUSTRATIONS.)

Scotia Collections — Siphonophora of the Scottish National Antarctic Expedition.

By **J. H. Koeppern,** Zoological Department, University of Edinburgh.

(Received 13th December 1912. Read 16th December 1912.)

The Siphonophora collected by the Scottish National Antarctic Expedition (1902-1904) were kindly entrusted to me for examination by Dr W. S. Bruce, to whom my thanks are also due for the loan of literature and charts, and for the permission to reproduce three photographs previously published in the Zoological Log of the expedition. I am grateful to Dr J. H. Ashworth for various suggestions during the course of my work.

The notorious difficulty of satisfactorily preserving such fragile forms of animal life has made the specific determination of a few of the specimens somewhat difficult. Some of the Physaliæ and Velellæ, however, are excellently preserved in formalin.

The structures described by Professor J. Arthur Thomson[1] as separated gonostyles of "Scotia" Siphonophora from the South Orkneys, probably belong to the species *Myriotheca austrogeorgia*,[2] whereas the detached tentacles referred to the Siphonophora by Dr J. Rennie[3] must be considered as parts of *Desmonema*.[4]

Family **PORPITIDÆ**, Brandt, 1835.

Genus **Porpita**, Lamarck, 1816.

Porpita umbella, O. F. Müller, 1776.

Eleven specimens referable to this species were collected from shore pools at Scotia Bay, South Orkneys, 2nd February 1904, the temperature being a little below freezing-point. Their diameters in the preserved state range from 7 to 12 mm. This is the most southern station from which the species has been recorded.

The macerated pneumatophore of a Porpitid, with a diameter of 3 mm., was caught in the tow-net at the surface, at Station 30, 11° 15′ N., 25° 20′ W., temp. 79° F. Small isolated tentacles closely resembling those of the Scotia Bay Porpitæ were preserved along with some Velellæ from Station 53, St Paul Rocks.

[1] *Proc. Roy. Phys. Soc. Edinburgh*, vol. xvi. (1904), pp. 19-22, 1 pl.

[2] J. Ritchie, "Supplementary Report on the Hydroids of the Scottish National Antarctic Expedition," *Trans. Roy. Soc. Ed.* (1909), vol. xlvii., pt. i., No. 4, p. 69.

[3] *Proc. Roy. Phys. Soc. Ed.*, vol. xvi. (1904), pp. 25-27, 1 pl.

[4] E. T. Browne, "Medusæ," *National Antarctic Expedition* (1910), v., p. 51.

Family **VELELLIDÆ**, Brandt, 1835.

Genus **Velella**, Lamarck, 1816.

Velella velella, Linnæus, 1758.

Velella spirans (Forskål, 1775).

In accordance with the strict application of the rules of priority, *V. velella* seems to be the correct name of this species. Specimens were obtained at Station 51 (1° 27′ N., 27° 56′ W., temp. 80·1°, Dec. 8th, 1902), and at Station 53 (0° 55′ N., 29° 22′ W., temp 79·8°, Dec. 10th, 1902). One well-preserved specimen is unlabelled, but has possibly been caught at Station 52 (1° 22′ N., 28° 10′ W., temp. 80°, Dec. 9th, 1902). According to the Zoological Log [1] Velellæ were also seen during the voyage at—

Stat. 61.	3° 38′ S.	33° 20′ W.	Temp. 79°	Dec. 13th, 1902.
Stat. 95.	32° 15′ S.	47° 30′ W.	Temp. 74·9°	Dec. 27th, 1902.
Stat. 360.	40° 59′ S.	55° 04′ W.	Temp. 61·6°	Jan. 25th, 1904.
Stat. 362.	43° 33′ S.	55° 07′ W.	Temp. 60°	Jan. 27th, 1904.

If the specimens are regarded from their longer side, the sail or crest runs from N.E. to S.W., as Agassiz found to be invariably the case in hundreds of Velellæ which he observed. Out of seventy-seven specimens examined by Chun,[2] seventy-one were of the type described, but in six the crest ran from S.E. to N.W. Lens and van Riemsdijk [3] state that in all five specimens of *V. pacifica*, collected by the Siboga expedition, the direction of the crests was S.E. to N.W.

The three Velellæ from the "Scotia," Station 51, were partly macerated; they measure respectively 42, 66 and 68 mm. in length, 16, 26 and 36 mm. in breadth, and the crest is 16, 29 and 23 mm. in height. Nine specimens, all of which are macerated, so as to leave only the chitinous [4] supporting substance, were taken at Station 53. The average dimensions of the "Scotia" Velellæ are, approximately, length 54 mm., breadth 20 mm., and height of crest 20 mm. On four of the specimens from St Paul Rocks, numerous white spiral coils, measuring from 2 to 9 mm. in diameter and being of a beady appearance, were observed. A microscopic examination showed them to be segmented eggs, probably those of a gastropod. As regards the distribution of the genus *Velella* in the Atlantic, the Flannan

[1] *Scott. Nat. Antarc. Exped.*, "Sci. Results Voyage 'Scotia,'" vol. iv., pt. i. (1908).

[2] C. Chun, *Die Siphonophoren der Plankton-Expedition*, Kiel and Leipzig (1897).

[3] A. D. Lens and T. van Riemsdijk, *The Siphonophora of the Siboga Expedition*, Leiden (1908).

[4] M. Henze, "Notiz über die chemische Zusammensetzung der Gerüstsubstanz von *Velella spirans*," *Hoppe Seyler's Zs. physiol. Chemie.*, LV. (1908).

Isles (W. E. Clarke) and lat. 43° 33′ S. (Bruce) seem to be the present known northern and southern limits.

Family **PHYSALIDÆ**, Brandt, 1835.

Genus **Physalia**, Lamarck, 1816.

Physalia arethusa, Browne, 1756.

Chun[1] distinguishes only two species of *Physalia*, the Atlantic-Mediterranean *P. arethusa* and the Indo-Pacific *P. utriculus*, since the

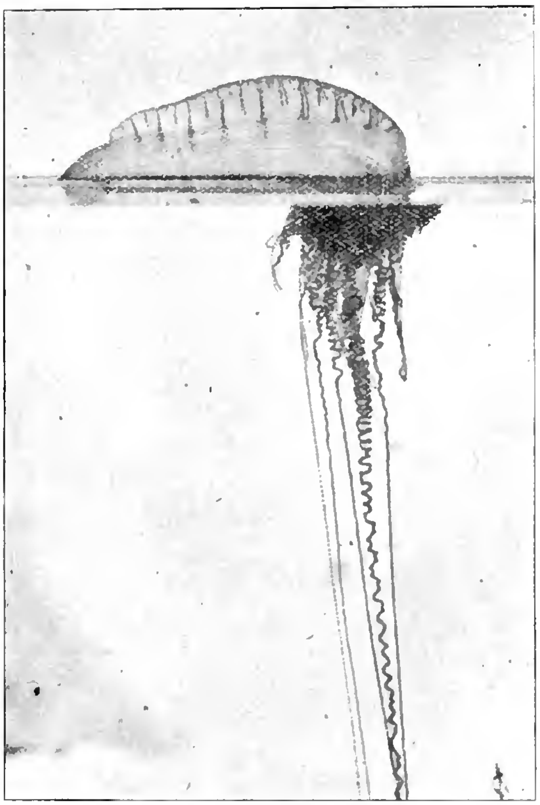

Fig. 1.

numerous species previously described have either been discovered to be young specimens or slight local variations. Specimens were collected at the following stations:—

Stat.	30.	11° 15′ N.	25° 20′ W.	Temp. 79°	Dec. 4th, 1902.
Stat.	81.	18° 24′ S.	37° 58′ W.	Temp. 79·9°	Dec. 20th, 1902.
Stat.	478.	Table Bay.	May 1904.		
Stat.	527.	11° 32′ N.	20° 30′ W.	Temp. 78·1°	June 19th, 1904.

[1] C. Chun, *Die Siphonophoren der Plankton-Expedition*, Kiel and Leipzig (1897).

The occurrence of Physaliæ has been recorded in the Zoological Log at Stations 42, 53, 57, 60, 72, 78, 82, 83, 95, 97, 508, 509, 525, 529, 530 and 531.

The five young Physaliæ taken in the tow-net at Station 30 have well developed pneumatophores 3, 3·5, 4, 6 and 12 mm. in length respectively, that of the largest specimen exhibiting a comparatively large polythalamic

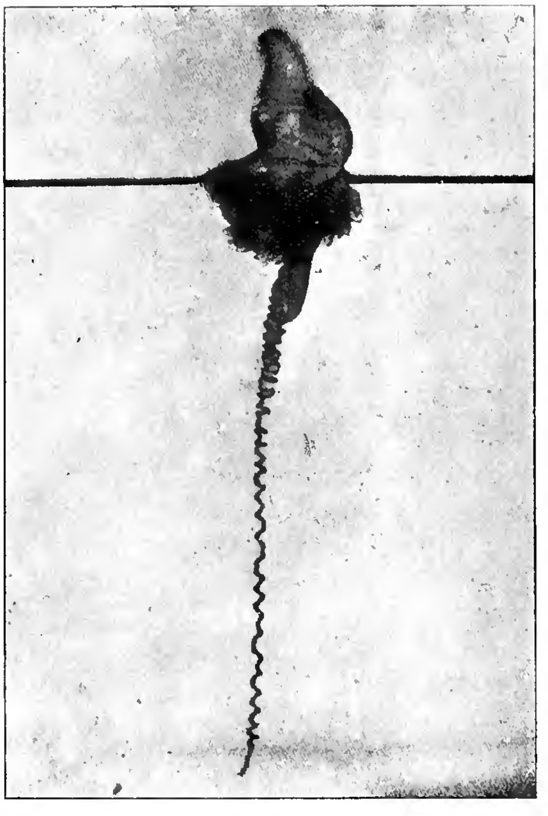

Fig. 2.

crest. Although not well preserved, several small siphons and a larger central one could be distinguished. The two specimens from Station 81 are very well preserved. The length of their pneumatophores measures roughly 9 and 10·5 cm., the breadth 4 and 4 cm., and the thickness, including crest, 5 and 4·5 cm. respectively. The crest and cormidia are well developed. Each specimen has about ten tentacles, the longest of which is in one case 30 cm., and in the other 24 cm. The example recorded from Table Bay (Station 478) is not in a very good state of preservation, the remnants

only of a few tentacles being present. The pneumatophore is 8 cm. long; the gastrozoöids and gonozoöids, though well developed, are much shrunk. The three well-preserved specimens from Station 527 differ from those of Station 81, in having one tentacle more highly developed than the others.

A faint tinge of pink is still noticeable in parts of their pneumatophores

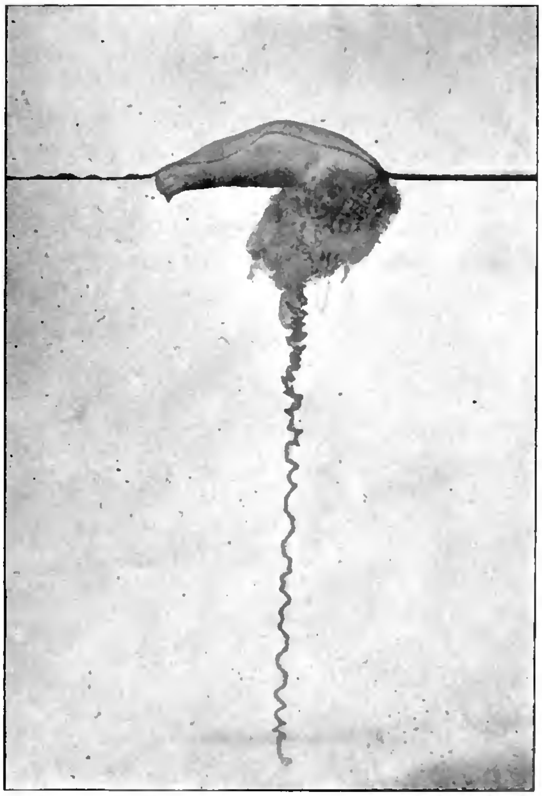

Fig. 3.

and in some of the zoöids. A coloured sketch of a *Physalia*, which was caught at Station 78, was made at the time and shows the edge of the crest as being of a delicate pink, whereas the aboral pole of the pneumatophore, the zoöids and the tentacles, are depicted as being of a vivid dark blue. The three photographs show the turning over on its side of a Physalia, which thereby presents a smaller surface to the wind.

Family **DIPHYIDÆ**, Eschscholtz, 1829.

Apart from a few not identifiable pieces of jelly, altogether eight nectophores of Diphyids, ranging from 24 to 40 mm. in length, were taken by the trawl (2300 f. to surface), at—

Stat.	53.	St Paul Rocks.		Temp. 79°	Dec. 10th, 1902.
Stat.	286.	68° 11′ S.	34° 17′ W.	Temp. 29°	March 5th, 1903.
Stat.	396.	67° 53′ S.	27° 20′ W.	Temp. 29·2°	Feb. 29th, 1904.
Stat.	416.	71° 22′ S.	18° 15′ W.	Temp. 29·6°	March 17th, 1904.
Stat.	450.	48° 00′ S.	9° 50′ W.	Temp. 40°	April 12th, 1904.

Three Eudoxiæ must be mentioned here, two from Station 396, and one from Station 450. The unsatisfactory state of their preservation makes all but the reference to the above family possible as regards classification. Their habitat, however, is of interest, as extending the range from which they have previously been recorded. The discovery of Diphyids as far south as 71° 22′ corresponds to their occurrence in Arctic seas.

(*Issued separately, 10th April* 1913.)

PART III.

POLYCHÆTA.

(Families SERPULIDÆ and SABELLIDÆ.)

III.—THE POLYCHÆTA (Families SERPULIDÆ and SABELLIDÆ) OF THE SCOTTISH NATIONAL ANTARCTIC EXPEDITION.

By HELEN L. M. PIXELL, B.Sc., F.Z.S.,
Demonstrator of Zoology and Reid Fellow, Bedford College, University of London.

(*WITH ONE PLATE.*)

Polychæta of the Families Serpulidæ and Sabellidæ, collected by the Scottish National Antarctic Expedition. By **Helen L. M. Pixell**, B.Sc., F.Z.S., Demonstrator of Zoology and Reid Fellow, Bedford College, University of London. *Communicated by* Dr J. H. Ashworth. (With One Plate.)

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The following is a list of the ten species, of which four are new. Eight different genera are represented :—

Family Serpulidæ.

Serpula vermicularis Linnaeus, from various stations (see p. 88).

Apomatus brownii n. sp., Station 417, lat. 71° 22′ S., long. 16° 34′ W., 1410 fathoms.

Salmacina dysteri (Huxley), Station 461, Gough Island, lat. 40° 20′ S., long. 9° 56′ 30″ W., 100 fathoms.

Spirorbis antarcticus n. sp., Station 325, Scotia Bay, South Orkneys, lat. 60° 43′ 42″ S., long. 44° 38′ 33″ W., 10 fathoms.

,, *patagonicus* Caullery and Mesnil, Station 478, Table Bay, Cape Town; also Station 118, Port Stanley, 4 to 5 fathoms.

,, *falklandicus* n. sp., Station 118, Port Stanley, Falkland Islands, 4 to 5 fathoms.

Family Sabellidæ.

1. *Dasychone violacea* (Schmarda), Station 478, Table Bay, S. Africa, shallow water.
2. *Eurato melanostigma* (Schmarda), Station 24, Cape Verde Islands, shore.
3. *Potamilla antarctica* Gravier, Station 349, Tussock Island, Falkland Islands, shore.
4. *Potamis scotiæ* n. sp., Station 417, lat. 71° 22′ S., long. 16° 34′ W., 1410 fathoms.

Family Serpulidæ.

Genus *Serpula*.

Generic characteristics :—

1. Collar-setæ of bayonet-shape, with spines at base of blade.
2. Operculum funnel-shaped, with numerous radii ending in serrations on margin.
3. Uncini with only a few teeth.

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Serpula vermicularis Linnæus, 1767.

For synonyms see MÖRCH (14, p. 381), SAINT-JOSEPH (16, p. 328), EHLERS (5, p. 219) and FAUVEL (6, p. 691).

Specific characteristics :—

1. Collar-setæ with generally two large blunt processes at base of blade.
2. Uncini generally have five teeth—there may be four, six, or seven.
3. Branchiæ (twenty to thirty-two pairs) long, with numerous pinnæ and bare filamentous extremities.
4. Serrations on operculum vary very much in number—there may be as many as a hundred.
5. Maximum length recorded 50 mm., with 157 segments.

Localities.—Station 325, Scotia Bay, South Orkneys, lat. 60° 42′ 43″ S., long. 44° 38′ 33″ W.; Station 346, Burdwood Bank, lat. 54° 25′ S., long. 57° 32′ W., 56 fathoms; Station 478, Table Bay, shore; Station 461, Gough Island. Part of a colony, with several specimens having intertwined tubes, was taken in a trap in MacDougal Bay, South Orkneys.

These tubes are cylindrical with trumpet-like ends, as described by M'INTOSH (12, p. 516) for *S. narconensis* Baird. I fully agree with EHLERS (5, p. 219) that this species is synonymous with *S. vermicularis*; the specimens show a considerable amount of variation, as is usual in this species, but there seem to be no points of difference having specific value.

There is one specimen only from Station 478, Table Bay, May 1904, with its tube adhering for its whole length to the shell of Mytilus. This tube is triangular in section, with a very distinct median ridge ending in a point overhanging the mouth.

Three tubes from Burdwood Bank, taken in the trawl in 56 fathoms, December 1905, Station 346, are solitary, almost cylindrical, but enlarge very gradually towards the anterior end, where there is a distinctly everted peristome. The tubes are ringed with former peristomes at intervals, showing successive zones of growth. They have no doubt been attached to some substratum, for a part of their length, and are more or less overgrown with a bryozoon. The largest, though incomplete posteriorly, is 70 mm. long and 4 mm. in diameter across the peristome. One of the smaller ones contained an animal 25 mm. long, having an operculum with thirty-two serrations, and gills with bare terminal ends intermediate in length between those from Scotia Bay and Table Bay. Fig. 1, *a* and *b*, shows the variation amongst the collar-setæ of a single fascicle: the former having the typical two processes; the latter, four almost equally large ones.

All the specimens are between 2 and 3 cm. in length, and have seventy to eighty segments. Their opercula have thirty-two to forty-one serrations, and their uncini generally six or seven teeth. The branchiæ (twenty-two to twenty-eight pairs) have in some cases very long bare terminal ends measuring quite 1 mm., instead of the more usual ·48 mm. according to SAINT-JOSEPH (16, p. 330).

The few specimens from Gough Island have less than thirty-two serrations to their opercula, but it seems that they are quite young.

Genus *Apomatus* Philippi, 1844.

Generic characteristics :—

1. Operculum globular, terminating a gill retaining its pinnæ.
2. Some of the thoracic setæ are bladed sickles (setæ of Apomatus).
3. Terminal dorsal gland present.

Apomatus brownii n. sp.

Specific characteristics :—

1. Collar-setæ with small fin at base of blade ; fig. 2, *a*.
2. Uncini begin on the second thoracic segment, and have only seven or eight teeth ; fig. 2, *d* and *e*.
3. Abdominal setæ sickle-shaped ; fig. 2, *c*.

Five specimens, more or less incomplete, from Station 417, lat. 71° 22′ S., long. 16° 34′ W., trawled at a depth of 1410 fathoms, 18th March 1904.

This form differs from all other previously described species of the genus in the characteristics 1 and 2 above, *i.e.* in the shape of the collar-setæ and the uncini. There is, however, complete agreement with the two main generic characteristics (1 and 2 above) as given by SAINT-JOSEPH (16, p. 373). It is to be noted that this species comes from very deep waters.

Tubes almost cylindrical and smooth, except for inconspicuous growth lines. The diameter of the oral aperture of the largest tube is 3·5 mm. ; 50 mm. from this is the other aperture 1·75 mm., but this is probably not the real end of the tube, which may have been attached to some substratum by a further narrower portion. Most of the tubes have obviously been longer, but only one, the smallest, shows a scar of attachment.

The animals were preserved in their tubes. The total length of the longest is 27 mm., and of the shortest 16 mm. ; the greatest width is 2 mm. The fifteen pairs of branchiæ are spirally coiled. They measure from 6 to 10 mm. in length, and are thin, with long fine pinnæ extending almost to the tops of the rachises.

One animal has its branchial crowns projecting from the tube, and has lost its operculum. Two others have lost their branchial crowns altogether. In the remaining two, the second dorsal gill on the left or right terminates in a transparent globular operculum. In one there is a secondary rudimentary operculum on the other side.

The collar is 1 mm. deep, entire ventrally, but notched laterally, and very much folded. There are only five or six collar-setæ of the characteristic form, which, with about half a dozen ordinary capillary setæ with narrow blades, make only a small fascicle. The other thoracic fascicles contain numerous setæ, comprising ordinary narrow blades and setæ of the usual Apomatus type (fig. 2, *b*).

The abdomen has only a very short asetigerous region, followed by 80 to 110 narrow segments with sickle-shaped setæ (fig. 2, *c*). Many of these sickles have, however, become much straightened, owing, no doubt, to their prolonged immersion in alcohol. The posterior setæ are very elongated. The dorsal gland, generally present in the young, is very little developed, and in two specimens appears to be wanting. There is a deep ventral fæcal groove which turns to the right on reaching the thorax.

The uncini have only seven or eight sharp teeth (fig. 2, *d* and *e*); consequently, if SAINT-JOSEPH's classification (16, p. 263) according to the characteristics of the uncini were rigorously adhered to, this species would have to be placed in a new genus in Group I., with Serpula, etc., instead of in the genus Apomatus, which SAINT-JOSEPH includes in his Group V., which is made up of forms whose uncini have very numerous and fine teeth.

Genus *Filograna* Oken, 1815.

Generic characteristics :—

1. Tube very slender, filiform, colonial.
2. Branchiæ eight.
3. Thorax with seven to nine segments.
4. Collar-setæ with a large fin-like expansion at base of blade.
5. Other thoracic setæ sickle-shaped (setæ of Salmacina), or ordinary bladed ones.
6. Abdominal setæ more or less geniculate and serrated.
7. Hermaphrodite.

Sub-genus *Salmacina* Claparède, 1870 (2, p. 176).

1. No operculum.
2. The ends of the branchiæ may or may not have spathulate enlargements due to the presence of large granular cells.

Salmacina dysteri (Huxley), 1855.

Protula dysteri Huxley, 1855 (10, p. 113).
Filopora filograna Dalyell, 1853 (3, p. 250).

Specific characteristics :—

1. Branchiæ with spathulate enlargements containing granular masses at their ends. Similar granules occur at the ends of the pinnæ, and just in front of their bases along the gill rachises.
2. Spermatozoa developed in segments anterior to those producing ova.

Locality.—Station 461, Gough Island, lat. 40° 20′ S., long. 9° 56′ 30″ W., 100 fathoms. Several fairly large masses brought up by the trawl with *Serpula vermicularis*, coral, etc. No specimens in process of budding were observed.

Genus *Spirorbis* Lamarck, 1801.

Characteristics of genus and sub-genera have been given in full (15, pp. 792–799).

Sub-genus *Paralæospira* Caullery and Mesnil (1, p. 202), emend. Pixell (15, pp. 795 and 799).

Spirorbis antarcticus n. sp.

Specific characteristics :—

1. Collar-setæ—a few small finely striated simple blades, fig. 3, *c*.
2. Third thoracic fascicle contains some bladed sickle-shaped setæ.
3. Abdominal setæ, flattened trumpets with one side produced.
4. Tube triangular in section and generally very regularly coiled (fig. 3, *a*).

Locality.—Several specimens growing on fucus, dredged at Station 325, April 1903, Scotia Bay, South Orkneys; lat. 60° 43′ 42″ S., long. 44° 38′ 33″ W., in 9 to 10 fathoms.

The large thick tubes are almost perfectly triangular in section and very regularly coiled to form a disc, with concave upper surface, and measuring up to 4 mm. across (fig. 3, *a*). There are nearly always young tubes attached to them, one specimen bearing as many as twelve of different sizes. In this they resemble CAULLERY and MESNIL'S (1, p. 203) *Spirorbis aggregatus*.

The opercular plate may be flat, convex, or conical, but has in every case a thin flattened talon. Small circular perforations occur in the calcareous plate, and through these project small membranous projections, which are generally thorn-shaped. Though the opercula vary so much, there is no doubt that all the variations should be included in the same species, for there are intermediate forms between the thin, flattened plate, which seems to be characteristic of young specimens, and the conical form. It is also very questionable whether details as to the shape of the operculum are ever sufficiently constant to be of much value in specific determination.

Many of the specimens are of very large size, some measuring over a centimetre in length. There are nine long branchiæ: the second on the left is transformed into the pedicle of the operculum, and is slightly larger than the others.

This species could only be included in the sub-genus *Paralæospira*, provided that the modified characteristics as suggested in a previous paper (15) be adopted for it, owing to the fact that it differs from all previously described *Paralæospira* in having simple blades for the collar-setæ (fig. 3, *c*). These are remarkably small, and there are only seven on each side, so that the whole fascicle is very insignificant. The other thoracic fascicles are much larger, and the uncini are about 40 mm. long. There are about twenty abdominal segments following a rather long asetigerous region.

Spirorbis patagonicus (Caullery and Mesnil), 1897 (1, p. 205); Ehlers, 1901 (5, p. 224).

Specific characteristics :—

1. Talon of operculum, a prolongation of the terminal shallow funnel.
2. Collar-setæ small, with a fin-like expansion at the base of finely serrated blade (fig. 4, *a*).
3. Numerous sickle-shaped setæ to 3rd thoracic segment.
4. Abdominal setæ large, flattened, and trumpet-shaped.
5. Large somewhat irregularly coiled tubes.

Localities.—Several specimens on the shell of Mytilus, from Station 478, Table Bay, Cape Town Docks, May 1904. Other specimens, with *Spirorbis falklandicus*, on a stone from the shore at Station 118, Port Stanley, Falkland Islands, January 1903.

Most of the tubes are rather smaller than those described by CAULLERY and MESNIL. They are generally loosely and irregularly coiled. All ages seem to be represented, and both the young with three thoracic segments only and the adults agree with the descriptions given by these authors.

There are apparently ten branchiæ, including the opercular pedicle, and about twenty abdominal segments. The largest specimen obtained whole from its tube measured 6 mm.

Paradexiospira Caullery and Mesnil (1, p. 195), emend. Pixell (15, p. 793).

Spirorbis falklandicus, n. sp.

1. Last thoracic segment without dorsal setæ.
2. Collar-setæ small, very finely serrated blades with large fin at base.
3. Operculum very similar to that of *S. vitreus.*
4. The 3rd thoracic fascicle contains bladed sickles (setæ of Apomatus) (fig. 5, *c*).

Several specimens, with *S. patagonicus*, on a stone from the shore at Station 118, Port Stanley, Falkland Islands, January 1903.

This is the first time that a species of the sub-genus *Paradexiospira* has been recorded from the Southern Hemisphere. CAULLERY and MESNIL (1, p. 195) state that the three species known to them, namely *S. cancellatus* Fabr., *S. vitreus* Fabr., and *S. violaceus* Lev., inhabit Greenland and Iceland. *S. vitreus* has since been found in the North Pacific (15, p. 793).

The tubes of *Spirorbis falklandicus* generally have three longitudinal ridges, the median one sometimes ending in a projection overhanging the mouth of the tube. The terminal part may be more or less ascending, and is rather more than 1 mm. in diameter. Only about one and a half turns of the spiral can be seen from the top, and the tube measures 3 mm. across.

Branchiæ ten, the second on the right bearing the operculum, as usual. In young specimens the operculum is almost flattened on the top, and has a massive, sometimes

bifid, talon (fig. 5, *a*). In older specimens this is replaced, as in *S. vitreus*, by a thin funnel-shaped one without a talon: in one animal examined, both were present, one inside the other, the thin funnel-shaped one having been produced before the loss of the smaller massive one.

There is a deep collar, and the species differs from *S. vitreus* and all other previously described *Paradexiospira* in having collar-setæ with such fine serrations that it is almost impossible to recognise any at all. I have already suggested that the characterisation of CAULLERY and MESNIL's sub-genera should be made more general (15, p. 793), and this is another instance of the necessity of such a step, for *S. falklandicus* is undoubtedly closely related to the three forms known to CAULLERY and MESNIL and placed by them in the sub-genus *Paradexiospira*. Of these collar-setæ there are about nine, making with a few of the usual fine capillary ones a bundle considerably smaller than the other thoracic fascicles.

The uncini of the thorax are 40 to 50 mm. long, and contain about seventeen teeth; those of the abdomen are much smaller, being only 20 mm long.

The abdominal setæ are flattened and trumpet-shaped, with one side produced.

There seem to be twenty or more abdominal segments, but I did not succeed in obtaining a complete specimen from a tube, the state of preservation not being good.

Family SABELLIDÆ.

Genus *Dasychone* Sars, 1861.

1. Thoracic and abdominal tori with single rows of avicular crotchets.
2. Thoracic setæ of one kind only.
3. Branchiæ with dorsal appendices.

Dasychone violacea (Schmarda), 1861.

Sabella violacea Schmarda (17, p. 34).
Dasychone violacea M'Intosh (12, p. 504).

1. Dorsal appendices large and somewhat spathulate, covering an ocellus on either side of the rachis.
2. A dark pigment spot on each side of every segment, between the fascicles of setæ and the tori.
3. Thorax of eight setigerous segments.
4. Crotchets with very fine serrations above the large fang.

Locality.—One specimen from Station 478, Table Bay, May 1904. Total length 26 mm., of which the branchiæ form 8 mm.; the width is about 4 mm., except close to the posterior end, where it decreases rapidly. There are seventy abdominal segments.

The setæ and crotchets agree entirely with those so clearly described and figured by M'INTOSH.

It will be noticed that this specimen is smaller than those described before: it agrees more nearly with SCHMARDA's specimens in having only twenty branchiæ. Each of these has seven pairs of well-formed dorsal appendices, with rudiments of others towards the tips. The specimen was by no means fully developed, nor was it sexually mature.

No trace of colour remains, except on the gills and the pigment spots already alluded to. The tube is also missing.

Genus *Eurato* Saint-Joseph, 1894 (16, p. 249).

Generic characteristics :—

1. Thoracic and abdominal tori with a single row of avicular crotchets.
2. Branchiæ without dorsal appendices and arranged in a single series.
3. Thoracic setæ all simple blades.

Eurato melanostigma (Schmarda).

Sabella melanostigma Schmarda, 1861 (17, p. 36), from Jamaica.

1. Branchiæ about half the length of the body, few in number, with short pinnæ and an interbranchial membrane.
2. A pigment spot on each side of every segment, between the fascicles of setæ and the tori.
3. Thorax of five setigerous segments (? always).

Several specimens from Station 24, Porte Grande, St Vincent, Cape Verde Islands.

These specimens seem to be immature, and are much smaller than SCHMARDA's; but from the latter's brief description they would seem to be the same species.

They are 5 mm. or less in length, the branchiæ when intact making up nearly 2 mm. of this; the greatest width is about 1 mm., and the largest number of abdominal segments counted was thirty-five.

The collar has two pointed ventral lobes, but is otherwise not very high, and stops short some distance from the mid-dorsal line.

The collar-setæ have long narrow blades (fig. 6, *a*); there are only four other setigerous thoracic segments, and these have slightly wider blades in addition to the long narrow ones (fig. 6, *b*). The abdominal segments have the wider blades only. The thoracic tori have about twelve avicular crotchets (fig. 6, *c*); the abdominal only seven.

The anal segment is asetigerous and very distinctly bi-lobed.

There are only seven or eight pairs of gills.

In no specimen were gonads apparent; this immature state may account for the small number of branchiæ and thoracic segments.

One very young specimen was 2 mm. long and 1 mm. wide, only very slightly tapered at each end, and containing eighteen setigerous segments; all of these seemed to have the setæ ventral to the tori, *i.e.* to be abdominal segments, except one or two

very small crowded segments anteriorly, in which no tori could be distinguished. The branchial crown was represented by two small buds with four finger-like projections.

No tube was present, but to one specimen was adhering a minute portion of a rather thin membrane, to which very small sand-grains were fixed, and this may have been a portion of a tube.

With these also was a larger specimen (8 mm. total length), in which no pigment spots were present, but which otherwise seemed identical with this species.

The pigment spots in *Eurato* (*Sabella*) *manicata* (9, p. 255) are differently arranged.

This is apparently the first time that this species has been recorded since SCHMARDA described it from Jamaica in 1861.

Genus *Potamilla* Malmgren, 1865 (13, pp. 401 and 402).

Generic characteristics :—

1. Thoracic tori, double rows, consisting of avicular crotchets and pennoned setæ respectively.
2. Abdominal tori, single rows of avicular crotchets.
3. Collar present.
4. Thoracic setæ of two forms—dorsally a few with simple blades, ventrally spathulo-mucronate.
5. Abdominal setæ simple blades.
6. Branchial crown not markedly spiral, and without sub-terminal eyes on rachises.

Potamilla antarctica Gravier, 1906 (7, p. 59).

1. Branchiæ seventeen pairs, with no trace of eyes, about one-fifth the length of the body.
2. Avicular crotchets of thorax and abdomen of characteristic shape (see Gravier (8) and (7) for figures).

Localities.—One specimen from shore pool at Station 349, Tussock Island, Falkland Islands; seven incomplete specimens, all of which had lost their branchial crowns, from the shore at Station 118, Cape Pembroke, Falkland Islands.

The tubes of the latter specimens are much overgrown by a colonial tunicate.

The anterior part of the tube of the Tussock Island specimen contained numerous larvæ, 5 mm. long, and having five or six segments. The specimen in the tube was well preserved, and was 31 mm. in length, of which the branchiæ made up 6 mm.

The other specimens are, without their branchial crowns, 27 mm. long and 3 mm. wide, and have nearly parallel sides—only a few of the terminal segments being narrower. The thorax consists of eight setigerous segments, and the abdomen of about fifty. The setæ were in nearly every segment broken off below the blade, and

it was only with considerable difficulty that any perfect ones were obtained. The collar has small dorsal lobes, and becomes gradually higher towards the mid-ventral line, where there is a deep fissure.

The ventral gland-shields are very distinct, separated by deep segmental fissures, and divided in the abdominal region by a deep and narrow fæcal groove, which crosses obliquely to the right on reaching the thorax, and is continued as a very shallow groove along the mid-dorsal surface.

No pigment spots could be made out at the posterior end, and there is practically no colour in the preserved animals; only faint transverse markings could be made out on the branchiæ. In all other points there seems to be exact similarity with Gravier's widely distributed species. At the same time, I cannot help thinking that the variation, which he points out (8, p. 145) as existing in two of the characteristics on which he has based his species in differentiating it from *P. neglecta* Malmgren and *P. incerta* Lang, tends to do away with its distinctness.

Genus *Potamis* Ehlers, 1887 (4, p. 278).

Generic characteristics:—

1. Thoracic tori double rows: avicular crotchets with long bases and pennoned setæ respectively.
2. Abdominal tori single rows of avicular crotchets.
3. Collar present.
4. Thoracic setæ of two forms—superior ones with rather wide blades, inferior sub-spathulate.
5. Abdominal setæ of two kinds—long narrow-bladed ones and short forms with wider blades (lanceolate) (fig. 7, *f*).
6. Gill bases sub-involute. Branchiæ without ocelli.

Potamis scotiæ n. sp.

1. Collar with high ventro-lateral lobes and deeply divided in the middle line.
2. Setæ and crotchets of characteristic shapes (fig. 7, *a–b*), differing in many ways from those of *P. spathiferus* Ehlers.
3. Ventral gland-shields quite distinct, divided in the abdominal region by a wide and shallow fæcal groove.

Locality.—One specimen, without its tube, taken in the trawl at Station 417, lat. 71° 22′ S., long. 16° 34′ W., from a depth of 1410 fathoms.

Total length 133 mm., of which 63 mm. is made up by the branchial crown, 10 mm. by the thorax, and 60 mm. by the abdomen. Greatest width 5 mm.

After being preserved in dilute formalin the general colour of the specimen is greenish-brown. The segments are clearly marked off from one another by inter-segmental constrictions, and the setæ protrude to a considerable distance.

The thorax has eight setigerous segments, the abdomen 52; the posterior abdominal segments are much shorter antero-posteriorly, and rather wider than the front ones. The gill rachises are nearly 1 mm. in diameter and very nearly cylindrical; in some cases they end in a small finger-like process, but the thin straggling pinnæ extend at irregular intervals nearly up to this end. There are sixteen on the left and fifteen on the right, the four ventral ones on each side being much smaller. To the most ventral one on each side is attached the membrane which, just below, enlarges greatly and forms a kind of pocket on each side; the membranes then approach one another and join together at the posterior end of the fissure between the ventro-lateral lobes of the collar.

From the dorsal aspect there is great resemblance to EHLERS' *P. spathiferus* (4, p. 278), the collars of both species being similar.

The first segment has no torus, and its setæ are of one kind only, similar to the superior ones of the other segments (fig. 7, *g*).

December 23, 1912.

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EXPLANATION OF THE PLATE.

Fig. 1. *Serpula vermicularis* L. Collar-setæ from a single specimen to show variation: 1*a*, with the normal two processes at base of blade; 1*b*, with four nearly equal processes. × 300.

Fig. 2. *Apomatus brownii* n. sp. 2*a*, collar-seta; 2*b*, bladed sickle from thorax; 2*c*, sickle-shaped seta from abdomen; 2*d*, thoracic uncinus; 2*e*, abdominal uncinus. × 375.

Fig. 3. *Spirorbis antarcticus* n. sp. 3*a*, tube with three small ones towards its centre, × 12; 3*b*, operculum, × 48; 3*c*, collar-seta, × 375.

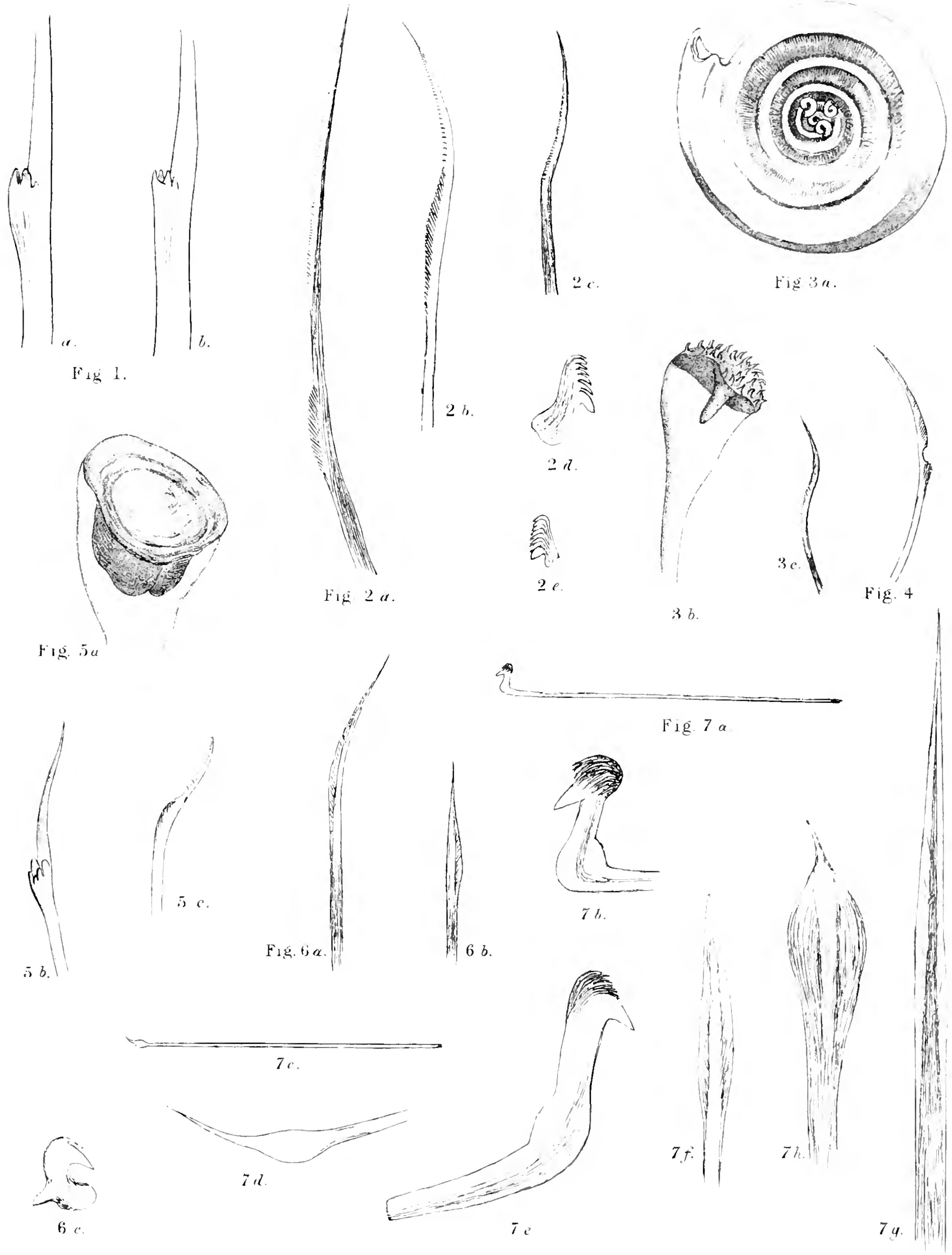
Fig. 4. *Spirorbis patagonicus* Caullery and Mesnil. Collar-seta, × 375.

Fig. 5. *Spirorbis falklandicus* n. sp. 5*a*, operculum of young specimen, × 36; 5*b*, collar-seta, × 375; 5*c*, seta of bladed sickle type, from third thoracic fascicle, × 375.

Fig. 6. *Eurato melanostigma* (Schmarda). 6*a* and 6*b*, thoracic setæ, × 220; 6*c*, thoracic crotchet, × 220.

Fig. 7. *Potamis scotiæ* n. sp. 7*a*, thoracic avicular crotchet, × 48; 7*b*, head of same, × 220; 7*c*, thoracic pennoned seta, × 48; 7*d*, head of same, × 220; 7*e*, abdominal avicular crotchet, × 220; 7*f*, abdominal lanceolate seta, × 150; 7*g*, superior thoracic seta, × 150; 7*h*, inferior thoracic seta, × 150.

PIXELL: "SCOTIA" POLYCHAETA.



H. L. M. Pixell del. McFarlane & Erskine Lith. Edin.

PART IV.

TURBELLARIA (II.).

IV.—THE TURBELLARIA OF THE SCOTTISH NATIONAL ANTARCTIC EXPEDITION. (2ND PAPER.)

By F. F. LAIDLAW, M.A., F.Z.S.

Turbellaria of the Scottish National Antarctic Expedition.—II.*

By **F. F. Laidlaw**, M.A., F.Z.S.

The two Polyclad Turbellaria recorded in this note were collected at the surface of the sea at Station 53, St Paul's Rocks, 0° 55′ N., 29° 22′ W., on December 10, 1902.

They are perfectly typical Planocera, which I cannot distinguish specifically from *P. pellucida* (Mertens). One of the specimens has the following dimensions: length, 10 mm.; breadth, 5·5 mm.

This individual differs from that figured by von Graff in possessing decidedly fewer eyes in the groups lying over the brain; otherwise the resemblance it bears to von Graff's example is exceedingly close.

The second specimen, which is not so well preserved as the first, is, however, specifically identical with it

Planocera pellucida is well known as a holopelagic organism, and has frequently been recorded from the Atlantic. For details of the structure of this interesting animal, see von Graff's account in *Zeit. f. wiss. Zoöl.*, Bd. lv. (1892), pp. 195–200, Taf. vii.

* For an account of the other Turbellaria collected by the Expedition, see J. F. Gemmill and R. T. Leiper, in *Trans. Roy. Soc. Edin.*, vol. xlv. (1907), pp. 819–827, reprinted in *Report on Scient. Results Voyage S.Y. "Scotia,"* vol. v. (1909), pp. 129–138.

PART V.

CORALS.

V.—THE CORALS OF THE SCOTTISH NATIONAL ANTARCTIC EXPEDITION.

By J. STANLEY GARDINER, M.A., F.R.S.,
Professor of Zoology and Comparative Anatomy in the University of Cambridge.

(*WITH TWO TEXT-FIGURES.*)

The Corals of the Scottish National Antarctic Expedition. By J. Stanley Gardiner, M.A., F.R.S., Professor of Zoology and Comparative Anatomy in the University of Cambridge. *Communicated by* Dr J. H. Ashworth.

(MS. received May 14, 1913. Read July 7, 1913. Issued separately September 1, 1913.)

The collection of *Scotia* corals is naturally small, since the main work of the Scottish National Antarctic Expedition was in high Southern latitudes, but, during the outward and homeward journeys of the *Scotia*, collections were made, when opportunity presented itself.

The species are interesting distributionally, but their soft parts are largely decayed. There are five species, of which one is a known species; three dead masses, generically determinable; and the last, a new species, which may in future prove of even greater interest than at the present time.

Madracis scotiæ, n. sp. (figs. 1 and 2).

Colony branching and anastomosing, stems 2–5 mm. in thickness.

Calicles studding the surface, with no determinable arrangement, rising as distinct flattened cones, the largest varying from ·5 to 1·5 mm. high. The surface between is conspicuous, as the cones are generally at least their diameter from one another, and in places two or three times this distance (1–3 mm.); it is finely granular.

Fig. 1. Fig. 2.

Madracis scotiæ, n.sp. Fig. 1, Corallum, natural size; fig. 2, Calicle, enlarged.

The calicular opening varies up to 1·2 mm. in diameter, and is round. Above it project the slightly exsert upper edges of the septa; costæ are not distinguishable. The septa are 8 in number, and extend as straight partitions to the centre of the calicle, where they fuse to the columella, which consists of a single upstanding rod.

In section, horizontal partitions are seen extending across the interseptal chambers.

(REPRINTED FROM THE TRANSACTIONS OF THE ROYAL SOCIETY OF EDINBURGH, VOL. XLIX., PP. 687–689.)

Such sections also indicate that the corallum thickens by deposition of carbonate of lime on the surface, not within the chambers.

Locality.—Station 81, lat. 18° 24′ S., long. 37° 58′ W., Abrolhos Bank, 36 fathoms, 20th Dec. 1902; two pieces of probably the same colony. The genus is recorded by MILNE EDWARDS and HAIME from Réunion, 25 fathoms (*Madracis pellana*, Valenciennes).

The specimen is very different from any previously described form, both in its raised calicles and in the considerable distance which separates them. I refer it to *Madracis*, but I cannot regard this identification as satisfactory *without* an examination of the polyps; indeed, I suspect its polyps will prove it to be the type of a new genus.

Desmophyllum sp.?

A small horn-shaped corallite, bent in the middle, over 20 mm. high by 5–6 mm. across the calicle, cannot be referred to any known species. There is only one system of the calicle complete, the rest having been broken into. The septa number 48, of which 12 deep down in the corallite have trabeculæ fusing to some slight degree with one another. The specimen is stained brown on the outside.

Locality.—Station 542, Princesse Alice Bank, lat. 37° 56′ N., long. 29° 11′ W., 350 fathoms, 4th July 1904.

Caryophyllia profunda, Moseley.

MOSELEY, *Report on the Corals, "Challenger" Expedition*, p. 138, pl. I. fig. 6, *a*, *b* (1881).

Three complete specimens 30–34 mm. high, three further specimens with broken stems but calicles complete, and broken fragments. Calicles varying from 16 × 14 mm. up to 24 × 21 mm. in diameter.

I have compared the specimens with the types of *Caryophyllia profunda*, Moseley, in the British Museum; the latter consist of about twenty specimens, including two large masses grown together as represented in the excellent figure on plate I. referred to above. The present specimens agree with the type in shape, and some of them, as are some of the types, are coloured brown on the outside, with perhaps a darker ring near the edge of the calicle. The costæ are rather more marked in the larger specimens; all have a peculiar shiny appearance on the outside of the corallite, and in no specimens do the costæ extend to the bases of attachment. The septa vary from 80 to 96 in number, and the pali in correspondence vary from 20 to 24 plates. The columella consists of twisted ribbons freely anastomosing underneath, the whole forming an oval-shaped mass varying up to one-third the length of the calicle, and generally being rather more than twice as long as broad. The regular arrangement of the ribbons in a line, as represented in MOSELEY's fig. 6*a*, is not typical either of the type specimen or of the forms under consideration.

The type specimens, taken as a whole, differ from the present specimens in being rather larger and more robust, viz. in having thicker septa and pali, coarser ribbons to the columella, and slightly more exsert septa. The type specimens show great variation, but individual specimens of the two collections agree in all particulars.

Locality.—Station 461, off Gough Island, lat. 40° 20′ S., long. 9° 56′ 30″ W., 100 fathoms, 23rd April 1904. MARENZELLER, "*Valdivia*" *Report*, p. 298, records a number of specimens from Station 167, New Amsterdam, 496 m. deep. The *Challenger* specimens were obtained off Tristan da Cunha, 100–150 fathoms.

The species, in its number of septa and pali and in the characters of its columella, resembles both *Caryophyllia cyathus* (Ell. & Sol.) and *Caryophyllia clavus*, Sacchi. MOSELEY remarks that it differs from *C. clavus* in having fewer and less equally prominent costæ, and in the greater abundance of its epitheca. *C. clavus* generally has a broad base of attachment, while *C. cyathus* is horn-shaped. Authentically named specimens of *C. cyathus* and *C. clavus* in the British Museum scarcely help in elucidating the differences; they are smaller and less robust in the sense given above. If the three really form one species, it seems certain that different localities have their special growth-forms, such as var. *smithii* (Stokes) off Devon and Cornwall, the Antarctic form under consideration, etc.

A large specimen reputed to be *C. clavus*, in the British Museum, from the Caribbean, is of interest as its pali converge towards each other in pairs over the tertiary septa, a character which I do not recollect having seen in any other *Caryophyllia*. It was almost certainly so named by DUNCAN himself. The fragments mentioned by MOSELEY, p. 139, from Cape Verde Islands, are much closer to the ordinary forms of *cyathus* than of *profunda*.

Amphihelia sp.?

MARENZELLER ("*Valdivia*" *Expedition*, Bd. vii., T. xiv., 1904) and DUNCAN (*Trans. Zool. Soc.*, pl. 45, fig. 1, 1873) give admirable figures of the mode of growth of *Amphihelia oculata* (Linnæus). The specimen before me is the basal anastomosing part of such a colony as represented in the above figures, with similar tubular prolongations. It was dead when obtained, and it is so much corroded that the species must be regarded as uncertain.

The specimen comes from Station 542, Princesse Alice Bank, lat. 37° 56′ N., long. 29° 11′ W., 350 fathoms, 4th July 1904. The genus has been recorded many times from Northern oceans, but it was not obtained either by the *Challenger* or *Valdivia* Expeditions in Southern seas. The present record indicates that it is a cosmopolitan genus.

Solenosmilia sp.?

A mass of dead material from Station 542, Princesse Alice Bank, lat. 37° 56′ N., long. 29° 11′ W., 350 fathoms, 4th July 1904, belongs to this genus, but I am not sure whether one piece is not *Lophohelia*; the whole is very badly corroded.

The species is probably the cosmopolitan *S. variabilis*, Duncan, originally described from N. Atlantic material. The *Challenger* records it from Tristan da Cunha, 1000 fathoms, Prince Edward Island, 310 fathoms, and Ascension Island, 42 fathoms. The *Valdivia* obtained it off the west coast of Portugal, 2200 m., and off the entrance to the Mediterranean, 1300 m.

PART VI.

FORAMINIFERA.

VI.—THE FORAMINIFERA OF THE SCOTTISH NATIONAL ANTARCTIC EXPEDITION.

By F. GORDON PEARCEY,
Bristol Museum ; late of the *Challenger* Expedition and Commission.

(*WITH TWO PLATES.*)

VI.—Foraminifera of the Scottish National Antarctic Expedition. By F. Gordon Pearcey, Bristol Museum; late of the *Challenger* Expedition and Commission. *Communicated by* Dr J. H. Harvey Pirie. (With Two Plates.)

(Read May 26, 1913. MS. received August 2, 1913. Issued separately March 30, 1914.)

The fauna of the Polar regions is of deep interest to zoologists generally, that of the Antarctic specially so, and in this the Rhizopodist can justly claim his share.

Since the return of the *Challenger* Expedition in 1876, the later British expeditions to this area, with the exception of the Scottish National Antarctic Expedition, did but little in the way of sounding and trawling in the deeper waters of the Antarctic. Although much additional work has been carried out, and many new and rare species of the higher forms of marine life from this region have been brought to light, comparatively little has been added to the Rhizopod fauna since the results of the *Challenger* Expedition were published. The following pages on the Foraminifera are due to the energy and enthusiasm of Dr W. S. Bruce, F.R.S.E., and his colleagues. The genera and species here enumerated and described have been obtained from samples of deposits sent to me at intervals by Dr Bruce and Dr J. H. Harvey Pirie, collected by them, during the S.Y. *Scotia* Expedition in 1903–4, chiefly from the area of the Weddell Sea, where the ocean floor is covered with terrigenous deposits of Blue Mud, or (as Dr Pirie calls them) Glacial Muds and Clays. A few samples were also obtained from the Southern Atlantic Ocean, over the areas where the deposits form the typical Globigerina and Diatom Oozes. With the exception of two or three samples of washings of the material taken by the trawl, the quantity available for examination was too meagre to enable one to tabulate a comprehensive distribution chart, or a complete list of the various genera and species that one might expect to find at the stations from which the samples were obtained. These samples, however, pointed to there being a rich Foraminiferal fauna.

Whenever the trawl or dredge was worked and a sufficient quantity of the deposit was brought up and washed, a considerable number of Foraminifera was obtained, more especially of the larger arenaceous types, which goes to prove that the Foraminiferal fauna is rich all over the Blue Mud area, and that the conditions of life are congenial on these deposits—close up to the Antarctic Continent. It has also been shown that similar conditions prevail in the Arctic seas and North Atlantic. More systematic work with the trawl, dredge, and sounding machine, and a larger quantity of material for examination, are necessary before one can speak definitely on the forms to be met with in any part of the area in question, or on any specially

defined deposit, except in the case of the pelagic species, which are known to diminish in size and numbers the farther south research is made. It is to the bottom-living forms we must specially look, to furnish us with definite information on the important questions relating to the geographical distribution of the Foraminifera. From present information, however, it would appear, with the exception of two or three genera and species, that the Foraminiferal fauna of both polar regions is strikingly similar—a fact which is probably connected with the generally uniform conditions of temperature extending over the bottom of the deep sea from pole to pole.

List of Stations at which Foraminifera were obtained from the Deposits, with their Position, Depth, and Nature of the Bottom.

Station.	Latitude.	Longitude.	Depth in Fathoms.	Bottom.	No. of Deposit.
118	Stanley Harbour, Falkland Islands		$2\frac{1}{4}$	Blue mud	2
286	68° 11′ S.	34° 17′ W.	2488	Glacial clay	13
291	67 33 S.	36 35 W.	2500	,, mud or clay and boulders	14*a*
295	66 40 S.	40 35 W.	2425	,, clay	15
300	65 29 S.	44 06 W.	2500	,, ,,	16
301	64 48 S.	44 26 W.	2485	,, mud and boulders	17
313	62 10 S.	41 20 W.	1775	,, ,, or sand	21
337*a*	59 46 S.	48 02 W.	2110	,, mud—Diatom ooze	26*a*
338	59 23 S.	49 08 W.	2180	Diatom ooze—volcanic sand	26*b*
342	56 54 S.	56 24 W.	1946	Globigerina ooze	28
346	54 25 S. Burdwood Bank	57 32 W.	56	,,	29
387	65 59 S.	33 06 W.	2625	Glacial clay	30
416	71 22 S.	18 15 W.	2370	,, mud or clay	37
417	71 22 S.	16 34 W.	1410	,, ,, and stones	38
418	71 32 S.	17 15 W.	1221	,, ,, and rocks	39
420	69 33 S.	15 19 W.	2620	,, ,,	40
421	68 32 S.	10 52 W.	2487	,, clay	41
438	56 58 S.	10 03 W.	2518	Diatom ooze—volcanic sand	45
447	51 07 S.	9 31 W.	2103	,,	46
451	48 06 S.	10 05 W.	1742	Diatom-Globigerina ooze	47
459	41 30 S.	9 55 W.	1998	Globigerina ooze	49
467	40 08 S.	1 50 E.	2645	,,	50
468	39 48 S.	2 33 E.	*circa* 2645*	,,	51
81	18° 24′ S. Abrolhos Bank	37° 58′ W.	36	Coral rock and sand	1

The examination of the *Scotia* deposits with regard to Foraminifera goes to prove, as did the *Challenger* work, that Foraminifera are more abundant and attain a higher development in size, especially the arenaceous forms, the nearer we approach the slopes of continental land between depths of 500 and 1000 fathoms, even though the

* This sample was taken by the trawl between two soundings, viz. that at Station 467 and that at Station 469, the latter depth being 2900 fathoms, in 39° 27′ S., 5° 50′ E. The probable depth is therefore about 2700 fathoms.

temperature be below 40° F. Such results were found over the Glacial Clay area in the Weddell Sea (see *Scotia* Station 420, where a fair sample of the deposit was obtained). This high development and abundance of individual species is probably due to vegetable and other organic material deposited in these areas, where the pelagic life, both animal and vegetable, accumulates in vast quantities.

Those few samples of the deposits obtained by the *Scotia* Expedition which I have examined for Foraminifera have enabled me to identify no less than 267 species; 11 of these are new, and are described and figured in this report. It is worthy of note that no less than 107 of them have been recorded from the warm and cold areas of the Faroe Channel in the North Atlantic.

In the systematic list I have thought it advisable, for the advantage of future workers in this comparatively unknown region, to denote briefly where each species has hitherto been recorded, with its range of depth. I find as a result of my examination that the Foraminiferal fauna of the Antarctic is richer south of 70° than north of it, and it appears to me that a line of demarcation should be drawn at this point, although the deposits are of a similar composition. This line will probably be found to apply in a like manner to the higher forms of marine life.

The classification adopted in this paper is that of Mr J. A. Cushman as far as he has published a scheme, *i.e.* for the Astrorhizidæ, Lituolidæ, and Textulariidæ, and that of the late Dr H. B. Brady for the remaining families.

SYSTEMATIC LIST, WITH NOTES ON DISTRIBUTION, AND DESCRIPTIONS OF NEW SPECIES.

Family *MILIOLIDÆ*.

Sub-family NUBECULARINÆ.

Genus Nubecularia, Defrance.

Nubecularia bradyi, Millet.

Obtained in fair numbers at Station 346, 56 fathoms. This irregular, wild-growing variety has its natural habitat in the shallow, warmer waters of the tropical and sub-tropical seas; it was, however, taken by the *Challenger* Expedition as far south as off Kerguelen, in 20 to 60 fathoms.

Sub-family MILIOLININÆ.

Genus Biloculina, d'Orbigny.

Biloculina elongata, d'Orbigny.

This cosmopolitan species was obtained (few) at three stations, 346, 459, and 467.

Biloculina ringens (Lamarck).

Found (rare) at three stations, 346, 420, and 459. It occurs in all seas and at all depths.

Biloculina depressa, d'Orbigny.

Taken sparingly at six stations, 342, 420, 447, 459, 467, and 468. It has a world-wide distribution and a great bathymetrical range.

Biloculina serrata, H. B. Brady.

This characteristic species has been found in material from two stations, 342 and 459 (rare).

Biloculina murrhyna, Schwager.

This species was also taken (rare) at Stations 342 and 459. Both this and the preceding species are characteristic of a Globigerina ooze-deposit.

Biloculina tubulosa, Costa.

A few specimens of this species were obtained from Station 459, 1998 fathoms.

Genus Spiroloculina, d'Orbigny.

Spiroloculina tenuis (Czjzek).

Taken (rare) in the *Scotia* material at Station 459, 1998 fathoms.

Spiroloculina limbata, d'Orbigny.

Obtained at Station 342, 1946 fathoms.

Genus Miliolina, Williamson.

Miliolina dentistoma, sp. nov. (Plate II. figs. 17–19.)

Test triloculine, broad, compressed; peripheral margins thick and rounded; visible chambers, three or four; the last chamber appears always imperfectly formed, with a deep transverse suture.

Aperture a wide, irregularly curved fissure, with a thick lip-like margin from which rise one or more short tooth-like projections. Two strong, prominent teeth situated a short distance inside the mouth, at the base of the apical opening, are not observable in a lateral aspect (see figs. 17–18, Plate II.).

Chamber walls smooth, and glazed externally, at times wavy. The length of the figured specimen is about $\frac{1}{30}$ inch (0·95 mm.).

Miliolina dentistoma was obtained in moderate numbers at Station 346, 56 fathoms.

Miliolina venusta (Karrer).

This distinct variety was found at five stations, 342, 346, 447, 459, and 467 (few or rare). *Miliolina venusta* is essentially a deep-sea form; so far as I am aware, it has

hitherto only been recorded from the Pacific Ocean; its range of depth being from 56 (*Scotia* Station 346) to 2700 fathoms.

Miliolina circularis (Bornemann).

A few specimens were found at Station 420, 2620 fathoms. These were all of normal character, and showed no signs of their tests being diminished in thickness, as might be expected at such a depth, where the deposit gave such a low percentage of $CaCO_3$.

Miliolina oblonga (Montagu).

Obtained sparingly at Stations 346 and 459.

Miliolina bucculenta, H. B. Brady.

This doubtful Triloculine form was found at three stations, 291, 313, and 420, but was not common. This species is hitherto known only from the Arctic Seas and North Atlantic, so far as I am aware. I have found it moderately common in the Faroe Channel in 630 fathoms. It is therefore of interest to find it fairly well distributed in the Weddell Sea.

Miliolina bucculenta, var. *placentiformis*, H. B. Brady.

This variety I obtained (rare) in the material from Station 420, 2620 fathoms. Brady records it in his report on the *Challenger* Foraminifera from two widely separate localities—off Culebra Island, West Indies, 390 fathoms; and Balfour Bay, Kerguelen, 20 to 50 fathoms.

Miliolina seminulum (Linné).

This, the most common species of the genus Miliolina, has been found in all localities from the most extreme point in the Arctic Seas to as far south as the edge of the Antarctic ice, and from the tidal zone down to 3000 fathoms. It was, however, obtained only at one *Scotia* station, viz. 346, 56 fathoms.

Miliolina fichteliana (d'Orbigny).

Obtained very sparingly at Station 468, 2645 fathoms.

Miliolina trigonula (Lamarck).

Taken at Station 346, 56 fathoms (rare).

Miliolina terquemiana, H. B. Brady.

This triangular striated form, which is very rare, was obtained from the material taken at Station 346, 56 fathoms; the only other known localities for this species are from shallow water off Ceylon, and in littoral sand on the east coast of Madagascar.

Miliolina ferussacii (d'Orbigny).

Also obtained at *Scotia* Station 346.

Miliolina tricarinata (d'Orbigny).

This cosmopolitan form was taken also at Station 346.

Sub-family HAUERININÆ.

Genus Articulina, d'Orbigny.

Articulina funalis, H. B. Brady.

This beautiful striate cylindrical species, in its typical form, was obtained (few) in the *Scotia* material from Station 346. It is one of the commonest southern and Antarctic shallow-water Foraminifera; its other known localities are off Kerguelen, 20 to 120 fathoms, and in Humboldt Bay, Papua, 37 fathoms, where it was taken by the *Challenger* Expedition in fair quantities.

Genus Planispirina, Seguenza.

Planispirina contraria (d'Orbigny).

Obtained (rare) at Station 346. This species has a wide distribution, and a range of depth from 40 to 2160 fathoms. I have collected this species off the Shetland Islands, among the Hebrides, and in the Faroe Channel.

Sub-family PENEROPLIDINÆ.

Genus Cornuspira, Schultze.

Cornuspira involvens, Reuss.

Taken (rare) at Station 346, 56 fathoms. It has previously been taken in the North and South Atlantic, North and South Pacific, and as far north as 83° 19′ N., ranging in depth from ·7 to 1900 fathoms.

Cornuspira foliacea (Philippi).

Obtained (rare) at Station 346. This species has a wide distribution, but attains its fullest development in the North Atlantic and Arctic Sea. I believe the *Scotia* record to be the farthest south that this species has been found.

Sub-family KERAMOSPHÆRINÆ.

Genus Keramosphæra, H. B. Brady.

Keramosphæra murrayi, H. B. Brady.

This exceedingly rare species, figured and described by the late Dr H. B. Brady, represents perhaps one of the most interesting living Foraminifera, both in form and structure. *Keramosphæra murrayi* is peculiar to the Antarctic Ocean; it was obtained

by the naturalists of the *Challenger* Expedition in lat. 53° 55′ S., long. 108° 35′ E., 1950 fathoms, in the Diatom ooze area; but only five specimens were found after examination of a large mass of the ooze, three of these being found after publication of the *Challenger* Report. It is therefore of interest to have obtained a perfect specimen among the material from Station 420, 2620 fathoms, in the Weddell Sea, outside the diatomaceous zone, in a terrigenous deposit of glacial mud containing but a trace of carbonate of lime; while it is worthy of note that 19·29 per cent of carbonate of lime was found in the Diatom ooze at the *Challenger* station (157) in which the *Keramosphæra* was first discovered.

Family *ASTRORHIZIDÆ*.

Sub-family ASTRORHIZINÆ.

Genus ASTRORHIZA, Sandahl.

Astrorhiza crassatina, H. B. Brady.

The *Scotia* specimens were obtained from the washings of trawled material, and reached me more or less damaged. Had they been placed in spirit when first taken, the general character and structure of the whole organism might have been studied, as they were present in fair quantity at Station 291.

Distribution.—Station 291, glacial mud, 2500 fathoms, common; Station 295, glacial mud, 2425 fathoms, few; Station 313, glacial mud, 1775 fathoms, rare. It has also been recorded from four stations in the North Pacific: near Japan, in 36 to 943 fathoms; off James Island, Galapagos, in 885 fathoms, from a Globigerina ooze; and from the Faroe Channel, by the *Porcupine*, at a depth of 640 fathoms.

Astrorhiza arenaria, Norman.

This interesting species was obtained by the *Scotia*, both in the character of branching cervicorn masses and the stellate form, at Station 291, 2500 fathoms, glacial mud, and Station 420, 2620 fathoms, glacial mud. It has been recorded from the Faroe Channel by H. B. BRADY and by myself at several points, ranging in depth from 530 to 650 fathoms; also from the coast of Norway (M. and G. O. SARS); from Kars Fjord, 180 fathoms (NORMAN); and at the *Challenger* Station 142, off the Cape of Good Hope, 150 fathoms.

Genus SYRINGAMMINA, H. B. Brady.

Syringammina minuta, sp. nov. (Plate II. figs. 1–2.)

Test adherent, consisting of a broad oval mass of branching tubes radiating from a common centre, and arranged in the form of a network. Walls arenaceous, made up of practically uniform fine grains of sand with a small amount of inorganic cement.

Apertures minute, situated at the peripheral ends, closed in by very fine argillaceous material. Colour, light gray with a yellowish tint. Diameter, one-sixth of an inch (4 mm.).

The general contour and minute character of the test of this species are, with the exception of the size of the arenaceous particles of which the walls of the test are built up, similar to *S. fragilissima* (BRADY).

Two specimens of *Syringammina minuta* were obtained from Station 420, 2620 fathoms, one being badly damaged owing to the excessively fragile nature of the test, which consists of a network of branching tubes more or less contorted and irregularly disposed (fig. 2). These are generally filled with dark olive or yellowish-green granulated sarcode similar to that found in the tests of the larger arenaceous Foraminifera.

The external diameter of the tubes varies somewhat, with a maximum of $\frac{1}{50}$ inch (0·5 mm.). Their external surface is fairly smooth; the interior is quite smooth and well finished. The walls are very thin, averaging about $\frac{1}{300}$ inch (0·08 mm.).

It is worthy of note that similar arenaceous forms were collected by the *Challenger* at a depth of 1000 fathoms off the Azores, but they were so fragile that, in washing the mud through sieves, they were broken to fragments and lost sight of, their character at that time not being known. Careful searching and preservation in future deep-sea dredging and trawling will probably bring additional specimens to light for further investigation.

Genus RHABDAMMINA, M. Sars.

Rhabdammina discreta, H. B. Brady.

Fine, well-developed specimens, in their typical form, were obtained in plenty at Station 420, 2620 fathoms, glacial mud; and a few at Station 468, 2700 fathoms, Globigerina ooze. This species has a wide range of distribution, having been recorded from the North and South Atlantic, from the North, South, and Western Pacific, in depths of from 350 to 2475 fathoms; off Kerguelen, 120 fathoms; and off the coast of Greenland, at a depth of 20 fathoms.

Rhabdammina cornuta, H. B. Brady.

This species was represented very rarely in the material examined from Station 420, 2620 fathoms.

Rhabdammina abyssorum, M. Sars.

This interesting species, in the typical form bearing the three radiating arms, with the walls of the test coarsely built exteriorly, and of a darkish blue-grey colour, was obtained at Stations 313, 337*a*, and 417—more abundant at 337*a* than at the other two. It has a world-wide distribution, and is found off the coast of Spitsbergen in great quantities; its range of depth is from 71 to 2439 fathoms.

Genus MARSIPELLA, Norman.

Marsipella cylindrica, H. B. Brady.

Fragmentary portions of both the straight and the curved tests of this species were obtained amongst the material from Station 342, 1946 fathoms, in a deposit of Globigerina ooze. They are of a more robust character than the type specimen. This species has been recorded from the Faroe Channel, both in the warm and in the cold area, in 530 to 640 fathoms; in the South Atlantic, 1900 fathoms; South Pacific, 210 fathoms; North Pacific, 139 to 1875 fathoms; and off Juan Fernandez, in 1375 fathoms.

Genus BATHYSIPHON, G. O. Sars.

Bathysiphon filiformis, G. O. Sars.

Obtained at Stations 301, 418, and 420, but nowhere abundant. The *Scotia* specimens, for the most part, show a considerable number of mineral particles built into the outer portion of the walls of the tests, giving them a more robust appearance than that of the type. This is due, doubtless, to the nature of the glacial deposit on which they were taken. Before the volume on the *Challenger* Foraminifera was published, *Bathysiphon* was looked upon as an exclusively northern type; it is therefore of interest to have found it so far south. Since the *Challenger* publication it has been recorded from six localities in the North Pacific, in depths from 617 to 1201 fathoms. It was taken for the first time in considerable abundance by G. O. SARS in the Hardanger Fjord, and occurs in deep water in the Bay of Biscay; off Banda, Amboyna, in 1425 fathoms; and in the warm area of the Faroe Channel, 570 fathoms.

Genus RHIZAMMINA, H. B. Brady.

Rhizammina indivisa, H. B. Brady.

Represented in the *Scotia* material by three specimens and a few fragments from Station 420, 2620 fathoms. Known from six stations in the North Pacific (CUSHMAN), 210 to 2086 fathoms; off the Cape of Good Hope (BRADY), 150 fathoms; and from the Faroe Channel (BRADY and PEARCEY), 540 fathoms.

Rhizammina algæformis, H. B. Brady.

This peculiar wild-growing species was obtained in a fragmentary condition, but typical in structure (dichotomously branching flexible tubes) at Stations 338 and 447, both Diatom ooze. The species is so delicate in construction that it is almost impossible to preserve it intact in a dry condition. This is the most southern record for the species.

Distribution.—South Pacific, off Fiji, in 210 fathoms; close to the equator, in 2425 fathoms; in abundance between Juan Fernandez and the coast of Chili, 2160 fathoms (BRADY). North Pacific, five stations, 1875 to 2900 fathoms (CUSHMAN).

Sub-family SACCAMMININÆ.

Genus Psammosphæra, F. E. Schulze.

Psammosphæra fusca, F. E. Schulze.

This would appear to be one of the commonest species of the Antarctic Seas, being obtained by the *Scotia* at no less than nine stations, 286, 313, 337*a*, 342, 416, 417, 418, 420, and 468. It attains a larger size and is more abundant in the far south stations on glacial deposits than in the Globigerina oozes. *Psammosphæra fusca* has a very wide distribution. It has been taken in shallow water off the coast of Norway (120 fathoms), and in 40 to 60 fathoms off Loch Scavaig, Skye; but its natural habitat is evidently the abyssal depths of the great oceans, where it attains its highest development, being known from several stations in the North Pacific, 1495 to 3026 fathoms; seven stations in the South Atlantic, 150 to 2800 fathoms; and ten stations in the North Atlantic, 440 to 2750 fathoms.

Genus Sorosphæra, H. B. Brady.

Sorosphæra confusa, H. B. Brady.

Several specimens of this colony-building form were obtained at Station 420. Hitherto it has been recorded from the Rockall Bank, 630 fathoms; off the Azores, 900 fathoms; the Faroe Channel, 542 fathoms; and the middle of the North Pacific, 2900 fathoms. It is therefore a wide extension of its range to have found it in the Weddell Sea.

Genus Saccammina, M. Sars.

Saccammina socialis, H. B. Brady.

Several specimens of this rare species were obtained at Stations 313 and 420. Known from the North Pacific, North Atlantic, and Faroe Channel.

Saccammina sphærica, M. Sars.

This species was obtained at five stations, 291, 301, 313, 417, and at 420, in considerable numbers, of large size, and typical in all its characters. Recorded from the North Atlantic (common); fjords of Norway; Faroe Channel; off the shores of Franz Josef Land; North Pacific; and near the Antarctic Continent (*Challenger*), where Brady describes it as indistinguishable from the North Atlantic type.

Genus Proteonina, Williamson.

Proteonina (Reophax) difflugiformis, H. B. Brady.

This apparently world-wide species was taken at eleven of the *Scotia's* stations, viz. 118, 300, 337*a*, 338, 342, 387, 447, 451, 459, 467, and 468. These vary in depth from $2\frac{1}{4}$ to 2645 fathoms, and include all the varieties of deposit obtained by the *Scotia*; but it is noteworthy that it was not obtained at any of the stations south of the circle.

Genus Pelosina, H. B. Brady.

Pelosina arborescens, sp. nov. (Plate I. figs. 1–5.)

Test vase-shaped, elongate, sub-cylindrical, erect, smooth, and unctuous to the touch, more or less flexible in the living state, rounded at the base, gradually narrowing towards the superior extremity, which is drawn out into a slender main tubular chamber, somewhat dome-shaped at its base.

From about one-third of the test upwards a number of dichotomous tubular branches extend at irregular intervals with graceful curves. These branches open out into the main chamber (Plate I. fig. 2). The wall at the base of each outgrowth is thicker and somewhat swollen, but after a short distance becomes more uniform in diameter. The walls of the main chamber are thick, composed of fine mud deposited on a slender chitinous envelope extending to the terminal apertures of the branching tubes, where it becomes quite thin, and consists of little more than a membrane, so thin and soft that it readily collapses on drying.

Colour, vandyke brown. Height of test, $1\frac{1}{4}$ to 2 inches (30 to 48 mm.) or more. A few minute filamentous outgrowths come off from the outer wall of the extremity of the basal portion, and appear in some cases to be tubular, but they are so fragile that they break off with the slightest manipulation. It is probable that these filaments serve to fix the test in an upright position in the deposit on the ocean floor.

Dr H. B. Brady, in describing *Pelosina variabilis*, says specimens of this (meaning *P. variabilis*) or a closely allied organism have been dredged off the west coast of Scotland. The specimens were nearly an inch in length, with walls somewhat flexible, the shape tolerably regular, long and tapering. The superior extremity, which is tubular and much drawn out, is divided into a number of minute branches, each terminating in an aperture exactly as shown in the larger arms of *Astrorhiza limicola*. It is therefore very probable that Dr Brady had seen a damaged dried specimen of *P. arborescens* sent to him by the late Dr David Robertson of Cumbrae, who also drew my attention to the fact that Dr Brady had never seen a living specimen of *P. arborescens* when he published his description of *P. variabilis*.

Fig. 1, Pl. I., represents a typical example of *Pelosina arborescens* taken by the trawl on board Sir John Murray's yacht *Medusa*, and kept alive by me for five months in a tank at Millport, Cumbrae. During this time it did not move from the position in which it was first placed in the tank, but repaired several of the damaged terminal tubular branches, and displayed the granulated sarcode and ramifying pseudopodia beautifully extended from the terminal apertures. It was sketched in this condition, and afterwards preserved in glycerine (fig. 1, Plate I.), and has been reproduced from the original drawing made by my son, F. J. M. C. Pearcey. Figs. 4–5, Plate I., represent a dried broken specimen from the Weddell Sea. Although much damaged, it shows all the essential characters of the specimen from the west coast of Scotland.

Distribution.—*Scotia* Station 420. 2620 fathoms, on a deposit of glacial mud or clay.

The test is of a lighter colour and rather coarser texture than the specimen figured in fig. 1, Pl. I. Off the west coast of Scotland, 50 to 90 fathoms, and sparingly in the deep-water area of Loch Fyne. Off Skate Island, 100 to 107 fathoms. It has also been taken off the coast of Norway (Norman), and doubtful specimens, probably belonging to this species, were obtained on the *Triton*, 1882, in the Faroe Channel, 640 fathoms.

Pelosina cylindrica, H. B. Brady.

Specimens with tests more delicate in the structure of their walls and rather smaller than the type specimen were obtained sparingly at Stations 313, 417, and 420. Previously known from the North Atlantic, North and Western Pacific, off New Zealand. and off the Antarctic Continent (*Challenger*).

Genus Technitella, Norman.

Technitella raphanus, H. B. Brady.

Two or three specimens answering to the description and figures given by Brady of this rare form were obtained from the *Scotia* material from Station 420. Obtained by the *Challenger* off Kandavu, Fiji Islands, in 210 fathoms.

Technitella asciformis, sp. nov. (Plate II. figs. 3–4.)

(Greek *askos*, a leather bottle.)

Test free, flask-shaped, consisting of a single chamber, ovately curved at the apical end; produced to a short thick neck; terminating in an everted phial-like lip grooved on the inside; aperture a small circular opening. Walls comparatively thick, composed of fine spicular material and fine argillaceous cement, with a strong chitinous lining which permits of the whole test becoming more or less flexible.

Colour, gray. Length, $\frac{1}{8}$ inch (3 mm.).

Its beautiful symmetry of contour is that of an old-time leather bottle. There are several fine slightly projecting ridges descending from beneath the everted lip to below the shoulder, where they merge into the general structure of the wall.

One specimen only was found, among the material from Station 420, 2620 fathoms.

Genus Tholosina, Rhumbler.

Tholosina (*Placopsilina*) *bulla*, H. B. Brady.

Several specimens of this peculiar little species were obtained from Station 420, attached to *Rhabdammina abyssorum* and *Rhizammina indivisa*, the light-coloured test showing up prominently against the darker-coloured walls of its hosts. It has hitherto been recorded from the North and South Atlantic (Brady); North Pacific (Brady, Cushman); and taken in the Faroe Channel by the *Triton*, although not recorded, in 515 fathoms.

Genus Webbinella, Rhumbler.

Webbinella (*Webbina*) *hemisphærica*, Jones, Parker, and Brady.

This simple little form was found, but very sparingly, in the washed material from Station 420, attached to rock-fragments. Known from the English coasts, Faroe Channel, and North-West Pacific, at depths varying from 25 to 630 fathoms.

Genus Crithionina, Goës.

Crithionina pisum, var. *hispida*, Flint.

A fine specimen of this simple-celled variety, considerably larger than the type, was found attached to a rock-fragment from Station 420. The chamber walls are built of sponge spicules arranged perpendicularly in an amorphous siliceous cement, and lined interiorly with a delicate chitinous membrane.

Cushman records this species from two stations in the North Pacific, 1259 and 1342 fathoms.

It was taken by the *Triton* and *Knight Errant* Expeditions in the Faroe Channel, 570 to 640 fathoms, and recorded by me under the generic name of *Sorosphæra* sp., with several others of a similar character.

Genus Thurammina, H. B. Brady.

Thurammina papillata, H. B. Brady.

Obtained (rarely) from Stations 291, 420, and 459. This species has a world-wide distribution, but appears to prefer the deep waters of the great oceans, where it has been found from depths of 540 to 3125 fathoms.

Thurammina albicans, H. B. Brady.

Two specimens of this rare species were found in the material from Station 342, in a deposit of Globigerina ooze. Recorded by Brady from *Challenger* Stations 323 and 246, off South America and in the North Pacific respectively, 1900 and 2050 fathoms.

Thurammina favosa, var. *reticulata*, var. nov. (Plate I. figs. 11–12.)

Test free, consisting of a single chamber; walls thin, composed of minute angular mineral particles firmly compacted in a siliceous cement of a bright ferric-red colour; apertures, one or more, round, minute (non-papillate or tubular), situated at irregular intervals over the surface of the test, and do not project beyond the exterior of the chamber wall.

The test is spherical or nearly so; the exterior is marked by an irregular network of raised ridges, which easily distinguish this form from the type *T. favosa*, Flint; the ridges are robust and irregular, of a much lighter colour than that of the wall

generally. The colour of the latter, however, shows through, and makes this species conspicuous by its colouring alone. The exterior aspect is illustrated in the drawings.

Diameter from $\frac{1}{70}$ to $\frac{1}{20}$ inch (0·5 to 1·5 mm.).

Obtained in moderate numbers at Station 420, 2620 fathoms.

Sub-family HYPERAMMININÆ.

Genus Hyperammina, H. B. Brady.

Hyperammina subnodosa, H. B. Brady.

Obtained at Station 420, moderately common. Known from the North and South Atlantic and North Pacific (Brady, and Cushman), 20 to 2384 fathoms. Found abundantly as far north as the coast of Greenland, 20 to 450 fathoms.

Hyperammina elongata, H. B. Brady.

From Stations 291 (few) and 313 (rare). Walls built of coarser material than is seen in typical specimens. Only one specimen complete, with the proloculum perfect. Distribution cosmopolitan, in depths of from 110 to 3125 fathoms.

Hyperammina friabilis, H. B. Brady.

A few typical specimens from Station 420, in a more or less fragmentary condition, but with the proloculum perfect. This species also has a wide distribution—off the coast of Greenland, Faroe Channel, North Atlantic, South Atlantic, North Pacific, 20 to 3800 fathoms.

Genus Saccorhiza, Eimer and Fickert.

Saccorhiza (*Hyperammina*) *ramosa* (H. B. Brady).

Obtained at Stations 291, 313, 337*a*, 342, 417, and 420, although nowhere numerous. Known from as far north as Franz Josef Land, and appears to be present in all seas wherever arenaceous organisms are found, at depths of from 39 to 3125 fathoms.

Genus Tolypammina, Rhumbler.

Tolypammina (*Hyperammina*) *vagans* (H. B. Brady).

Fine typical specimens, but of a dark grayish-brown colour, from Stations 291, 417, and 420. World-wide distribution. Bathymetrical range, 20 to 3800 fathoms.

Genus Ammolagena, Eimer and Fickert.

Ammolagena (*Webbina*) *clavata* (Jones and Parker).

From Stations 291 (common), 313, 342, and 420 (rare), attached to *Rhabdammina*, *Psammosphæra*, *Saccammina*, and on rock-fragments. A widely distributed form—off the coast of Norway, Faroe Channel, North Atlantic, South Atlantic, North Pacific, 90 to 2000 fathoms.

Sub-family AMMODISCINÆ.

Genus Ammodiscus, Reuss.

Ammodiscus incertus (d'Orbigny).

Found sparingly at Station 337*a*. A species of very wide distribution and extensive range in depth. 15 to 2110 fathoms.

Genus Gordiammina, Rhumbler.

Gordiammina (*Ammodiscus*) *charoides* (Jones and Parker).

This brilliant and beautifully coiled little species has been taken at Stations 342, 416, 447, 451, and 459, although not in any abundance. Widely distributed, from as far north as the Faroe Channel to as far south as off Kerguelen, although the present record extends its southern limits. Bathymetrical range, 90 to 2575 fathoms.

Gordiammina (*Ammodiscus*) *gordialis* (Jones and Parker).

Sparingly at Station 342 only. Known from as far north as off Franz Josef Land to as far south as off Kerguelen. 55 to 3125 fathoms.

Family *LITUOLIDÆ*.

Sub-family ASCHEMONELLINÆ.

Genus Aschemonella, H. B. Brady.

Aschemonella catenata (Norman).

A few specimens from Station 420. A widely distributed species; in the Atlantic and Pacific from depths of from 390 to 2900 fathoms.

Aschemonella ramuliformis, H. B. Brady.

One or two specimens of this rare species also obtained from Station 420. Hitherto known only from the South Atlantic and North Pacific (*Challenger*), from depths of 1900 to 3125 fathoms.

Sub-family REOPHACINÆ.

Genus Reophax, Montfort.

Reophax adunca, H. B. Brady.

This rare species was obtained sparingly at Station 420 only. Known from the Faroe Channel, North Atlantic, South Atlantic, southern Indian Ocean, and Pacific. Range of depth, 540 to 2900 fathoms.

Reophax nodulosa, H. B. Brady.

This beautifully built form, one of the largest species amongst recent arenaceous Foraminifera, is represented in the *Scotia* collection from seven stations, viz. 301, 313, 416, 417, 418, 420, and 447. At Station 417 it was in great numbers and of very large dimensions, several specimens measuring more than one inch in length, and girth in proportion, the finest I have ever seen. This species has practically a world-wide distribution and a great range in depth, from comparatively shallow water to 3950 fathoms.

Reophax robustus, sp. nov. (Plate I. figs. 6–10.)

Test straight; composed of few (two to four) chambers or segments; chambers spherical, last chamber generally somewhat elongated, each much larger than its predecessor; with a well-formed and firmly constructed tubular orifice; walls composed of very coarse sand-grains, compactly built, and beautifully ornamented externally with large angular mineral particles, such as quartz, felspar, magnetite, garnet, zircon, and hornblende, giving a beautiful but very robust appearance to the whole structure. Length, $\frac{1}{10}$ to $\frac{3}{16}$ inch.

Reophax robustum may be noted as one of the most beautiful members of the genus; it is readily recognised by its robust appearance and body-colour, which is of a yellowish gray. This is broken up, however, by the variously coloured minerals which stand out prominently from the walls, in which they are firmly cemented by a light yellow-brown siliceous cement.

The interior of the chamber walls is smooth or nearly so, but appears to possess little or no chitinous lining. The simple tubular apertures are of a bright ferric-brown colour, which stands out conspicuously at the distal end of each chamber, where they terminate in a drawn-out tubular neck, giving the test a beautifully finished appearance.

Reophax robustum is one of the most abundant species obtained at Station 420, 2620 fathoms, but it was not found in the material from any of the other localities.

Reophax dentaliniformis, H. B. Brady.

Obtained in its typical form at Stations 313 and 447, but rare. This species has a fairly wide distribution in the depths of most of the great ocean basins.

Reophax membranacea, H. B. Brady.

This little, delicate, semi-chitinous form was found, rare, at Station 313. It is exclusively a deep-sea species, and comparatively rare, ranging in depth from 1775 to 3950 fathoms.

Reophax scorpiurus, Montfort.

A very common cosmopolitan species, but apparently sparingly distributed in Antarctic Seas. Found only at Station 342. Obtained by the *Challenger* off Heard Island, in 75 fathoms.

Reophax distans, H. B. Brady.

This rare species was obtained very sparingly and only in imperfect condition in the material from Station 459.

Distribution.—Faroe Channel, 355 fathoms; off Kerguelen, 1570 fathoms; North Pacific, where it is moderately common in the deepest waters.

Reophax pilulifera, H. B. Brady.

Obtained at Stations 291, 301, 313, and 420; not common. A comparatively rare species, peculiar to deep water. Known from off the south of Ireland, South Atlantic, and Pacific. Depth, 437 to 2900 fathoms.

Genus Hormosina, H. B. Brady.

Hormosina normani, H. B. Brady.

This large species, characterised by its fine texture, smooth surface of its chamber walls, and dark brown cement, was obtained in fair abundance and of very large size at Station 417. Several specimens from here measure $\frac{5}{16}$ inch in length, with the final segment fully $\frac{3}{16}$ inch across. It was not uncommon at Station 291, and rare at Station 313.

The species is rather an uncommon one, and is exclusively a deep-water form. Wherever taken it is usually found in fair numbers, but owing to its delicate structure it is seldom in perfect condition.

Habitat.—North Atlantic, 1380 and 1750 fathoms; Pacific (more abundant), 1100 to 2900 fathoms (*Challenger*).

Hormosina globulifera, H. B. Brady.

Stations 295 and 420, rare. Known from all the great ocean basins, in depths between 440 fathoms and 2900 fathoms.

Hormosina irregularis, sp. nov. (Plate I. figs. 13–15.)

Test irregular; composed of from two to five subspherical chambers, of which those at the commencement are the smallest. They are all closely embracing. Apertures small, each at the end of a definite tubular, somewhat cone-shaped neck (which is often of a bright ferric-brown colour from the tip of the neck downwards) situated at the apex or distal end of each chamber. Successive chambers may be placed at right angles or obliquely to their predecessors. Walls finely arenaceous, thin; surface smooth both within and without. Colour, light pearly gray. Length, $\frac{1}{8}$ inch (3 mm.) or more.

This interesting form was taken sparingly at Station 420 only.

Sub-family TROCHAMMININÆ.

Genus Haplophragmoides, Cushman.

Haplophragmoides (Haplophragmium) scitulum (H. B. Brady).

This nautiloid form was obtained at Stations 291, 313, 416, and 417, but rare. Recorded from both Atlantics and from the Pacific, ranging in depth from 66 to 2900 fathoms.

Haplophragmoides (Trochammina) trullissatum (H. B. Brady).

From Stations 300, 337*a*, 416, and 420, rare. World-wide distribution, ranging in depth from 570 to 3950 fathoms.

Haplophragmoides (Haplophragmium) glomeratum (H. B. Brady).

This minute spiral form was obtained at Station 420 only (rare). A common species in Arctic Seas and in all the ocean basins, ranging in depth from 23 to 2675 fathoms.

Haplophragmoides (Haplophragmium) canariense (d'Orbigny).

At Station 337*a* only (rare). Cosmopolitan; at depths of from 2 to 3950 fathoms.

Haplophragmoides (Haplophragmium) rotulatum (H. B. Brady).

This rare and exclusively deep-sea form was taken at Station 337*a* (few) and Station 342 (rare). Previous records:—North Atlantic, Brady; Pacific, Cushman.

Haplophragmoides (Lituola) subglobosum (G. O. Sars).

At Stations 300, 313, 416, 417, 418, 420, and 447, but nowhere common. Cosmopolitan, and from quite shallow water down to 3950 fathoms.

Haplophragmoides umbilicatum, sp. nov. (Plate II. figs. 8–10.)

Test free; roughly nautiloid; plano-spiral; composed of three coils. Walls comparatively thin (unequally); deeply umbilicated on both sides; very rough and robust externally, almost smooth internally; generally with a thin chitinous lining; chambers broad and arched; peripheral margin roughly involute; first and second coils often exposed in the umbilical region. Six to seven chambers in the last-formed coil; aperture a crescentic slit at the base of the apertural face. Colour a light yellowish brown. Diameter $\frac{1}{11}$ inch (2·1 mm.) or less.

This species is a coarse sandy form resembling in some respects *Haplophragmoides rotulatum*, but is readily distinguished from that species by the character of its chambers. These are larger, not so compactly built, and more coarsely arenaceous (Plate II. fig. 10), also the last chamber is subspherical.

Haplophragmoides umbilicatum was found in abundance in the deposit from Station 420, 2620 fathoms, glacial mud, but not from any other.

Genus CRIBROSTOMOIDES, Cushman.

Cribrostomoides bradyi, Cushman.

(*Haplophragmium latidorsatum* (Bornemann)).

Obtained from Stations 313, 418, 420, 459, and 467 (rare). One of the commonest of arenaceous deep-sea Foraminifera. Range, from Franz Josef Land to the Antarctic Continent, and in all oceans, at depths of from 113 to 3950 fathoms.

Genus CYCLAMMINA, H. B. Brady.

Cyclammina cancellata, H. B. Brady.

Good specimens of this species, the largest of its genus, with its wonderful labyrinthine structure, the function of which has yet to be discovered, were obtained, but rarely, at Stations 420 and 447. North and South Atlantic and Pacific Oceans, 75 to 2900 fathoms.

Cyclammina pusilla, H. B. Brady.

This handsome little species has been found at seven stations, viz. 300, 313, 338, 416, 417, 420, and 447, but nowhere common. Not known, so far as I am aware, from the North Atlantic, and from but one station in the South Atlantic and one in the Antarctic (*Challenger*). Common in the Pacific (CUSHMAN). 93 to 2879 fathoms.

Cyclammina contorta, sp. nov. (Plate II. figs. 5–7.)

Test nautiloid, compressed, slightly umbilicate, convex towards the peripheral edge; composed of from three to four convolutions, the last two completely enveloping the others; segments numerous, usually fifteen in number. Walls of test finely arenaceous, and thin externally; body of walls and throughout the labyrinthine structure with larger angular mineral particles incorporated. The chambers of the first convolution and the earlier ones of the second are thin-walled and but slightly labyrinthine: all the succeeding chambers become partly labyrinthine, and the last three or four completely so (Plate II. fig. 7). Suture lines slightly depressed and contorted anteriorly; exterior smooth, slightly iridescent; imperforate in the perfect state, but when the outer wall is rubbed or broken away the open tubules of the labyrinthine communications with the main chambers become exposed to view; aperture usually a curved slit, but in some specimens this is altered into three or more circular openings or pores situated at the base of the apertural face.

Colour vandyke brown near the area of the umbilicus, becoming much lighter at the periphery; suture lines very dark, almost black.

Diameter, 2·5 to 4·2 mm.

This species in its earlier stages of development closely resembles *Cyclammina pusilla*, and this resemblance can be seen when the later convolutions are broken away, leaving the earlier chambers exposed (Plate II. fig. 7). All the specimens I have examined are of the microspheric form.

Obtained at Stations 417 and 420, but not abundant.

Genus AMMOBACULITES, Cushman.

Ammobaculites (*Haplophragmium*) *agglutinans* (d'Orbigny).

This, perhaps the most common species of all arenaceous Foraminifera, was obtained from Stations 337*a*, 338, 342, 447, 459, and 467, but nowhere very abundantly. Its distribution is world-wide, and its range of depth from quite shallow water down to over 3000 fathoms.

Ammobaculites americanus, Cushman.

From Station 342 only (rare). BRADY records this species, under the name of *Haplophragmium fontinense*, from the South Atlantic, 1900 fathoms; from the South Pacific, 1375 fathoms; and amongst the islands off the coast of Patagonia, 40 to 140 fathoms. CUSHMAN also records it from the Mexican coast, 772 fathoms.

Ammobaculites (*Haplophragmium*) *tenuimargo* (H. B. Brady).

This interesting species was taken (rare) at two stations, 313 and 420. It is a rare form; only six other localities, very wide apart, are known where this species has been obtained: in the Faroe Channel, warm area, 530 fathoms; south-west of the Canaries, in 2740 fathoms; east of Buenos Aires, 1900 fathoms; north of Papua, 1070 fathoms; east of New Zealand, 1100 fathoms; and at one station in the North Pacific, 3950 fathoms.

Genus PLACOPSILINA, d'Orbigny.

Placopsilina vesicularis, H. B. Brady.

Obtained (rare) at one station only, 420, 2620 fathoms, attached to rock-fragments. This species, which is generally associated with a rich arenaceous fauna, has hitherto been taken in the Faroe Channel, 560 fathoms; between the north-west of Ireland and the Rockall Bank, 630 to 1443 fathoms; from the South Atlantic east of Buenos Aires, 1900 fathoms. These are the only localities known; it is therefore worthy of note that this species has been found in the Weddell Sea.

Genus TROCHAMMINA, Parker and Jones.

Trochammina (*Haplophragmium*) *nana* (H. B. Brady).

Taken at two *Scotia* stations, 118 and 337*a* (rare). This minute species appears to be at home either in deep or shallow water; it has a wide distribution. In the Arctic

Seas it is found abundantly, in depths ranging from 89 to 145 fathoms; and it has been taken in the North and South Atlantic, in 1900 to 2350 fathoms; also in the Pacific Ocean, in depths varying from 245 to 3125 fathoms.

Trochammina (Haplophragmium) globigeriniformis (Parker and Jones).

This species, one of the most beautifully constructed forms of the genus, has been taken at six stations, viz. 313, 337*a*, 342, 417, 447, and 459, but nowhere common. *Trochammina globigeriniformis* has a world-wide distribution and a great range of depth, from Franz Josef Land, in the Arctic Seas, to the Antarctic Continent, in depths ranging from 15 to 3950 fathoms, and is one of the commonest arenaceous Foraminifera in the deeper waters of all the great ocean basins.

Trochammina nitida, H. B. Brady.

This rotaliform species is somewhat rare, but is easily identified from its congeners by the complanate superior surface of the test and its even margin. Found at Stations 118 and 346, but not common. Known from as far north as Franz Josef Land to as far south as off Prince Edward Island, in depths of from 50 to 1070 fathoms.

Trochammina (Haplophragmium) turbinata (H. B. Brady).

From Stations 300 and 447 (rare). Known from one station in the South Atlantic, off Amboyna, and from eight stations in the Pacific (Brady and Cushman). Range of depth, 66 to 2050 fathoms.

Genus Globotextularia, Eimer and Fickert.

Globotextularia (Haplophragmium) anceps (H. B. Brady).

This characteristic wild-growing species was found at Station 342 only (rare). It is known from Davis Straits, off Culebra Island, off the west coast of South America, and from two stations in the North Pacific. Range of depth, 196 to 2200 fathoms.

Genus Ammochilostoma, Eimer and Fickert.

Ammochilostoma (Trochammina) galeata (H. B. Brady).

This rare, inconspicuous, but handsome form was found at one station only, No. 459 (rare). It is exclusively a deep-sea species, being known from a few localities only in the North Atlantic, South Atlantic, and Pacific, at depths of from 1825 to 2750 fathoms.

Ammochilostoma (Trochammina) pauciloculata (H. B. Brady).

A few specimens of this brilliant little species were obtained from Stations 447 and 459 (rare). Recorded from all the great ocean basins, mainly from deep water in mid-ocean, although its range is from 173 to 2395 fathoms.

Family *TEXTULARIIDÆ.*

Sub-family SPIROPLECTINÆ.

Genus Spiroplecta.

Spiroplecta americana, Ehrenberg.

Obtained (rare) at one station by the *Scotia*, 459, 1995 fathoms; the only other record for this species, so far as I am aware, is by the *Challenger* Expedition, off Raine Island, North Australia, 155 fathoms.

Spiroplecta biformis, Parker and Jones.

This minute species in its typical form was obtained (rare) at Station 337*a*, 2110 fathoms. *S. biformis* is readily distinguished from its allies by the uniform manner in which its test is built, consisting of very fine arenaceous material and brown cement. It is to be found more frequently in the Arctic Seas, as far north as 80° lat., in depths varying from 27 to 145 fathoms; in the South Atlantic east of Buenos Aires, 1900 fathoms; and in the South Pacific, 2375 fathoms.

Sub-family TEXTULARIINÆ.

Genus Textularia, Defrance.

Textularia conica, d'Orbigny.

Obtained at Station 342 (rare). *T. conica* is a very generally diffused species, and is found most abundantly in the coral seas of the tropical and subtropical regions.

Textularia concava (Karrer).

This species was taken (rare) at Station 342, 1946 fathoms. It is recorded from several stations in the North Atlantic, from 173 to 2750 fathoms; from the South Atlantic, in mid-ocean, 2475 fathoms; and at a number of stations in the Pacific Ocean, from shallow water to 2600 fathoms.

Textularia agglutinans, d'Orbigny.

Found in the material from Station 459, 1998 fathoms. *T. agglutinans* is perhaps the commonest species of the genus *Textularia*, and the most typical arenaceous variety; it has a cosmopolitan distribution, both geographical and bathymetrical, and has been recorded in depths ranging from 5 to 3125 fathoms.

Textularia aspera, H. B. Brady.

Obtained (rare) from one station only, 467, 2645 fathoms. This species has a geographical range from the Faroe Channel to the North Pacific, and has been collected in depths from 210 to 2900 fathoms.

Genus Bolivina, d'Orbigny.

Bolivina reticulata, Hantken.

A few specimens of this species were found from Station 451, 1741 fathoms. It has not been recorded in the North Atlantic; the *Challenger* Expedition obtained this species as far south as off Kerguelen, in 1570 fathoms.

Bolivina nobilis, Hantken.

Obtained (rare) at Station 451. This species has only been recorded hitherto from the South Pacific Ocean, from shallow water to 1355 fathoms.

Bolivina punctata, d'Orbigny.

Taken at three stations, 346 (few), 459 (few), and 467 (rare). This species has a cosmopolitan distribution, and a correspondingly wide range of depth, from 2 to 2750 fathoms.

Bolivina textilarioides, Reuss.

Found (rare) in the material from Station 346, 56 fathoms.

Genus Pleurostomella, Reuss.

Pleurostomella alternans, d'Orbigny.

This interesting species was obtained (rare) at Station 459, 1998 fathoms. The only other records for this species are off the Ki Islands, south-west of Papua, 129 fathoms; south of the Low Archipelago, 2075 fathoms; and off the Galapagos Islands, in 1379 fathoms.

Sub-family VERNEUILININÆ.

Genus Verneuilina, d'Orbigny.

Verneuilina bradyi, Cushman.

Taken sparingly at Station 342, 1946 fathoms. *V. bradyi* is a common deep-water form, and has a wide distribution, from about lat. 60° N., south as far as the Antarctic Continent, with a range of depth from 420 fathoms in the North Atlantic to 3125 fathoms in the North Pacific.

Genus Gaudryina, d'Orbigny.

Gaudryina pseudofiliformis, Cushman.

This new species was created by Cushman for the reception of those recent forms figured and described by Brady and by him referred to the cretaceous species

G. filiformis, Berthelin. From the examination of *Challenger* specimens and others, I consider CUSHMAN is quite correct, and have therefore followed his example.

I have obtained good representatives of *G. pseudofiliformis* from two *Scotia* stations, 313, 1775 fathoms, and 338, 2180 fathoms, and these are the most southern records for this species.

Gaudryina bradyi, Cushman.

This species is a common deep-sea form, which Dr H. B. BRADY, in his *Challenger* Report, erroneously records under the name of *G. pupoides.* Although I believe CUSHMAN to be correct in his reference to this species, it would have been more to the point had he given it a name which conveyed some definite specific character.

G. bradyi was taken at three stations, 342, 459, and 467. It has been hitherto collected as far north as lat. 60° N., and is generally met with in most samples of deep-sea deposits. The *Scotia's* records are the most southerly known.

Genus CLAVULINA, d'Orbigny.

Clavulina communis, d'Orbigny.

This species is a comparatively common form in tropical and subtropical areas; it has been collected in from moderate depths down to 2300 fathoms, and is recorded from the North Atlantic to as far south as the Antarctic Continent.

I have found it in *Scotia* material from six stations, 313 (rare), 337*a* (few), 342 (rare), 417, 418, and 447 (rare).

Sub-family BULIMININÆ.

Genus BULIMINA, d'Orbigny.

Bulimina aculeata, d'Orbigny.

Obtained at two stations, 118 (rare) and 451 (few). This species has been collected as far north as the North Cape on the coast of Norway, and as far south as the Antarctic Continent.

Bulimina buchiana, d'Orbigny.

Taken at one station only, 451 (few); it is a common species in the North Atlantic from lat. 60° N. to the equator, and has been collected from depths of 150 to 1675 fathoms. The *Scotia* record is the most southerly point at which this species has been obtained.

Bulimina ovata, d'Orbigny.

This species was obtained (rare) at Station 459, 1998 fathoms, in a deposit of Globigerina ooze.

Bulimina elegantissima, d'Orbigny.

This species was obtained in abundance at Station 118, 24 fathoms. *B. elegantissima* has been taken as far north as the west coast of Novaya Zemlya. It is also found on the shores of the British Islands, Belgium, and France. It was taken by the *Challenger* Expedition off the Falkland Islands in 6 fathoms; east coast of Australia, 2 to 410 fathoms; South Pacific, 6 to 610 fathoms; off the coast of South America, from Peru to Cape Horn.

Genus VIRGULINA, d'Orbigny.

Virgulina pauciloculata, H. B. Brady.

This minute species was obtained (sparingly) at Station 459, 1998 fathoms; the only other records are off the shores of New Guinea and the adjacent islands, in depths from 11 to 129 fathoms.

Virgulina schreibersiana, Czjzek.

This somewhat doubtful species has been taken at four *Scotia* stations, 417, 418, 467, and 468. Nowhere abundant.

It has a very extensive distribution, and although it has been recorded from shallow water, its natural habitat would appear to be in the deeper waters of the great ocean basins; its range of depth is from 11 to 3125 fathoms. The *Scotia's* records are the farthest south from which this species has been obtained.

Sub-family CASSIDULININÆ.

Genus CASSIDULINA, d'Orbigny.

Cassidulina crassa, d'Orbigny.

Obtained at Station 346, 56 fathoms (common); its distribution is world-wide, from lat. 83° 11′ N. to as far south as the Antarctic Continent, ranging in depth from comparatively shallow water to the deepest water in mid-ocean.

Cassidulina subglobosa, H. B. Brady.

This fine species was obtained at no less than nine stations, 118, 286, 313, 342, 417, 447, 459, 467, and 468, although it is not common at any of them. *C. subglobosa* is, generally speaking, a deep-sea type, and has been recorded from all the great ocean basins.

Cassidulina lævigata, d'Orbigny.

This species was obtained (few) at two stations, 118, $2\frac{1}{4}$ fathoms, and 451, 1741 fathoms. *C. lævigata* is one of the commonest Arctic Foraminifera, and has a world-wide distribution; it was found as far south as the Antarctic Continent by the *Challenger* Expedition. Its range of depth is from very shallow water, round the British coast, to 1741 fathoms, in the Southern Ocean.

Cassidulina calabra (Seguenza).

Obtained sparingly at Station 346, 56 fathoms. The only other records for this species are off Raine Island, Torres Straits, 155 fathoms, and off Kandavu, Fiji, 610 fathoms.

Cassidulina parkeriana, H. B. Brady.

Two specimens of this species were obtained at Station 346, 56 fathoms.

Genus Ehrenbergina, Reuss.

Ehrenbergina serrata, Reuss.

This interesting species was obtained (rare) at Station 342, 1946 fathoms. It has hitherto been recorded from the North and South Atlantic, and is comparatively common in the North and South Pacific, generally being found in the area of the Globigerina ooze. The *Scotia* station is the most southerly record.

Ehrenbergina pupa (d'Orbigny).

Taken at Station 342, 1946 fathoms. It has hitherto only been collected off the Azores, in 450 fathoms; off the Falkland Islands, in 1035 fathoms; off the mouth of Rio de la Plata, 13 fathoms; and off the coast of Patagonia, 120 and 175 fathoms.

Family *LAGENIDÆ*.

Sub-family LAGENINÆ.

Genus Lagena, Walker and Boys.

Lagena globosa (Montagu).

Obtained at Stations 346 (few), 417 (rare), 459 (few), and 467 (rare). This species is common in all seas and at all depths, wherever marine deposits have been examined by the rhizopodist.

Lagena apiculata (Reuss).

Obtained sparingly at Stations 342, 346, and 459.

Lagena longispina, H. B. Brady.

This interesting deep-sea variety was obtained sparingly at Station 459, 1998 fathoms.

Lagena lævis (Montagu).

This simple form has been obtained (few) at Stations 118 and 459. It is a very common species, and has been found living in every sea from within 10 degrees of the North Pole to the Antarctic Continent, and at every depth from the tidal zone down to 2435 fathoms.

Lagena vulgaris, var. *pertuso-marginata*, Rymer Jones.

Obtained sparingly at Station 346.

Lagena gracillima (Seguenza).

Taken (rare) at Station 459, 1998 fathoms; a cosmopolitan species.

Lagena truncata, H. B. Brady.

This species was found (rare) at Stations 459 and 467.

Lagena hispida, Reuss.

One or two specimens of this species in its typical form were taken at Station 346.

Lagena striata (d'Orbigny).

Obtained (few) at Station 346, 56 fathoms.

Lagena lineata (Williamson).

A few specimens of this common and widely distributed species were found from Station 346.

Lagena distoma, Parker and Jones.

A few specimens of this species were found at Station 467.

Lagena variata, H. B. Brady.

This rare variety also was obtained at Station 346.

Lagena sulcata (Walker and Jacob).

Obtained at Stations 346 (few), 459 (few), and 467 (rare). It is one of the most abundant and most generally distributed of all the members of the genus; it has hitherto been recorded in every latitude, from Baffin's Bay in the north to Heard Island in the Southern Ocean. Its bathymetrical range extends from the littoral zone to a depth of 2750 fathoms.

Lagena acuticosta, Reuss.

Found (rare) at Station 342, 1946 fathoms.

Lagena gracilis, Williamson.

This species was found in the deposits taken from Stations 346 (common), 459 (few), and 467 (rare). It is a very common form, and found all over the world, from the shallowest water down to 2775 fathoms.

Lagena semistriata, Williamson.

Obtained at Stations 346 (few), 417 (rare), and 467 (rare).

Lagena multicosta, Karrer.

Obtained sparingly at Stations 342 and 459.

Lagena stelligera, H. B. Brady.

Obtained (rare) at Station 459, 1998 fathoms.

Lagena exsculpta, H. B. Brady.

This species was found at Stations 342 and 447 (rare). It is a somewhat rare form, apparently confined to the deep areas of mid-ocean.

Lagena desmophora, Rymer Jones.

Taken at Station 459, 1998 fathoms, very sparingly.

Lagena torquata, H. B. Brady.

Taken (rare) at Station 342, 1946 fathoms. This species was taken by the *Challenger* Expedition in the South Pacific, north of Juan Fernandez Island, in 1375 fathoms.

Lagena feildeniana, H. B. Brady.

This beautiful striato-punctate variety was found (rare) at Stations 447, 459, and 467. It is by no means a common species; it has been collected from as far north as 79° N., in 80 fathoms; and in the Southern Ocean to the west of Marion (Prince Edward) Island, in 1570 fathoms; and in comparatively shallow water in the Pacific Ocean.

Lagena squamosa (Montagu).

Lagena squamosa, one of the commonest species, was obtained at Stations 118, 346, 417, and 459, but not in any numbers.

Lagena seminuda, H. B. Brady.

Another deep-sea variety; obtained (rare) at Station 467, 2645 fathoms.

Lagena lævigata (Reuss).

Was moderately common at Station 346.

Lagena millettii, Chaster.

This species was also found (rare) at Station 467.

Lagena lucida, Williamson.

A few specimens of this compressed variety of *L. lævigata* were obtained from Station 346, 56 fathoms.

Lagena acuta (Reuss).

Taken at Stations 342 (rare) and 346 (few). *Lagena acuta*, like the preceding species, is found all over the world, ranging in depth from 2 to 3125 fathoms.

Lagena staphyllearia (Schwager).

Obtained (rare) at Station 447 only. This species appears to be confined to the deeper waters of the North and South Atlantic, whence it is recorded by the *Challenger* as being obtained in 2200 to 2750 fathoms; but in the Southern Ocean and South Pacific it occurs in shallow water near the coast-line.

Lagena marginata (Walker and Boys).

This cosmopolitan species was found sparingly at Stations 342, 346, 459, and 468. Its bathymetrical distribution is also very extensive; it has been taken from the littoral zone down to 3125 fathoms.

Lagena semimarginata, Reuss.

Obtained at Stations 346, 459, and 468, sparingly.

Lagena lagenoides, var. *tenuistriata*, H. B. Brady.

Also found (rare) at Station 346.

Lagena formosa, Schwager.

Obtained (very rare) at Station 417, 1410 fathoms. *L. formosa* is a typical deep-sea species; it was also collected near the Antarctic Continent by the *Challenger* Expedition, in 1300 fathoms; and in the North Atlantic Ocean in 2750 fathoms.

Lagena trigonomarginata, Parker and Jones.

Several specimens of this somewhat rare species were also obtained from Station 346; it has been collected in the North Pacific at a depth of 2300 fathoms.

Lagena quinquelatera, H. B. Brady.

Found (rare) at Station 342, 1946 fathoms. This species is recorded from the *Challenger* Expedition in the South Pacific, 2350 fathoms; and from off Marion (Prince Edward) Island, Southern Ocean, in 50 to 150 fathoms.

Lagena orbignyana (Seguenza).

Obtained (rare) at Stations 118, 346, 417, 447, 459, 467, and 468.

Lagena bicarinata (Terquem).

Found (rare) at Station 346.

Lagena castrensis, Schwager.

Rare at Station 346, 56 fathoms.

Lagena quadricostulata, Reuss.

Taken at Stations 346 and 459. *L. quadricostulata*, by no means a common form, was obtained by the *Challenger* Expedition in Balfour Bay, Kerguelen, 20 to 50 fathoms; and off Sydney, Australia, in 410 fathoms.

Lagena fimbriata, H. B. Brady.

Taken (very rare) at Station 467, 2645 fathoms. *L. fimbriata* is a rare variety; its natural habitat is in the deeper waters of mid-ocean.

Lagena auriculata, H. B. Brady.

Taken at Stations 342 and 346 (rare).

Lagena alveolata, H. B. Brady.

Obtained (rare) at Station 459 only. This species has been collected only from the deep waters of the great ocean basins; it has been recorded from the North Atlantic, 2750 fathoms; South Atlantic, 2200 fathoms; Southern Ocean, 2600 fathoms; and from South and North Pacific, 2300 fathoms.

Lagena hispidipholus, sp. nov. (Plate II. figs. 11–13.)

Test of variable contour; oblong, compressed, ovate, elongate; sometimes subangular. Walls semi-transparent; superior surface covered with short, pointed spines (hispid), thickest at the margin of the inferior surface, where they form a distinct thickened rim all round. Inferior surface comparatively thin, sole-like; glassy, with raised ridges; diffused with minute foramina, and minute spines which may be altogether absent. Aperture a short, tubular neck, projecting abruptly from the apical end of the test; ornamented with a number (six or more) of minute parallel rings, which occupy the entire neck from its junction with the body to the free end. Diameter $\frac{1}{25}$ inch (1 mm.).

This variety of the genus *Lagena* would appear from the flattened sole-like inferior surface to have been an adherent form, although I have not seen a specimen actually *in situ*. *Lagena hispidipholus* was obtained (rare) from Station 346, 56 fathoms, from the broken-down colonies of *Cephalodiscus agglutinans*, and has therefore most probably become an adherent form by being enclosed between the chitinous tubes built up by the *Cephalodiscus* during the enlargement of their colonies.

Sub-family NODOSARINÆ.

Genus Nodosaria, Lamarck.

Nodosaria roemeri, Neugeboren.

This variety was obtained (rare) at Stations 342 and 346. *N. roemeri* is by no means a common form; I have collected this species in the warm area of the Faroe Channel.

Nodosaria perversa, Schwager.

Obtained (rare) at Station 342. This species has only been recorded hitherto from off the Ki Islands, south-west of Papua, in 120 fathoms.

Nodosaria calomorpha, Reuss.

Obtained at Stations 118 (rare) and 459 (rare). This minute species has been collected from the North Atlantic, in 1215 fathoms; the South Atlantic, 1990 and 2200 fathoms; off the Falkland Islands, in 6 fathoms; off Kerguelen, 120 fathoms; off Ki Islands, 129 to 580 fathoms; and in 95 fathoms off the Philippine Islands.

Nodosaria mucronata, Neugeboren.

A moderately common form in the North Atlantic, and off the British coast, from shallow water to 1750 fathoms; in the South Atlantic, to 2350 fathoms; and in the Pacific Ocean, from 345 to 2600 fathoms. I have found this species (rare) at Stations 417 and 467; these are the most southerly records known for *N. mucronata*.

Nodosaria consobrina, var. *emaciata*, Reuss.

Obtained (rare) at Station 467. I have taken this species in the warm area of the Faroe Channel.

Nodosaria scalaris, var. *separans*, H. B. Brady.

Several specimens of this variety were obtained at Station 346, 56 fathoms. This is a common form off the coast of New Zealand, in 275 fathoms.

Nodosaria proxima, Silvestri.

Obtained (rare) at Station 346. *N. proxima* appears to prefer the warmer waters of the coral seas. Brady records it from Torres Straits, in 155 fathoms; off the Philippines, 95 fathoms; off the reefs at Honolulu, 40 fathoms; and off the Azores, in 450 fathoms.

Nodosaria setosa, Schwager.

Found (rare) at Station 346.

Nodosaria filiformis, d'Orbigny.

This species was also obtained sparingly at Station 346.

Genus Cristellaria, Lamarck.

Cristellaria convergens, Bornemann.

This species was found at Stations 337*a* (rare), 342 (few), 418 (rare), and 447 (rare). The natural habitat of this species is in the deeper waters of the great ocean basins. It has been collected in the North Atlantic, in 2740 fathoms; in the South Atlantic, 2350 fathoms; and in the Pacific Ocean, from 16 to 1850 fathoms.

Cristellaria cultrata, var. (Montfort).

A dentate variety was obtained (rare) at one station only, 451, 1741 fathoms. This species has been recorded from as far north as the Arctic Circle, and as far south as the shores of Patagonia, but in most cases from comparatively shallow water.

Cristellaria articulata, Reuss.

Obtained frequently at Station 346, 56 fathoms. Previously taken off Culebra Island, West Indies, 390 fathoms, and off Tristan da Cunha, 100 to 150 (abundant).

Cristellaria crepidula (Fichtel and Moll).

This species has a wide distribution, and is chiefly confined to comparatively shallow water. It was obtained in fair numbers at Station 346, 56 fathoms. *C. crepidula* has been collected from as far north as Davis Straits (lat. 68° 50′ N.), and is a common form in the North Sea and Atlantic; its range of depth is from 6 fathoms in the Pacific to 2350 fathoms in the tropical part of the South Atlantic.

Cristellaria schloenbachi, Reuss.

Obtained (rare) at Station 346. Taken by the *Challenger* Expedition off Bermuda, 435 fathoms, and Culebra Island, West Indies, 390 fathoms; also off Raine Island, North Australia, 115 fathoms.

Cristellaria acutauricularis (Fichtel and Moll).

This thick ovoid variety was also taken (rare) at Station 346. It is not a common form. It has been found in the North Atlantic, in from 390 to 2750 fathoms; off the Cape of Good Hope, 150 fathoms; and from six stations in the South Pacific, in depths ranging from 155 to 2350 fathoms; but at all times rare.

Genus Amphicoryne, Schlumberger.

Amphicoryne falx (Jones and Parker).

This interesting dimorphous striated variety was obtained (rare) at Station 346, 56 fathoms; this species is also found in the warm area of the Faroe Channel, in 516 fathoms.

Sub-family POLYMORPHININÆ.

Genus Polymorphina, d'Orbigny.

Polymorphina inflata, sp. nov. (Plate II. figs. 14–16.)

Test elongate, forming a somewhat obscure triserial spire, having five visible chambers tapering to a point at the inferior extremity; oblong and more or less inflated; the last chamber much the largest and more inflated than the rest; compressed transversely; each chamber separated by excavated sutures. Aperture a round opening encircled by a number of radiating grooves near the centre of the final chamber; furnished with a short entosolenian tube extending into the cavity of the last chamber. Length, $\frac{1}{15}$ inch (1·7 mm.).

The erect position of the chambers, inflated contour of the test, and separated excavated suture lines are sufficient to distinguish this species from its near allies; the chamber walls are thin, smooth, and beautifully transparent. *Polymorphina inflata* was found sparingly at Station 346, 56 fathoms.

Polymorphina angusta, Egger.

This species (rare) was taken at four stations, 342, 346, 447, and 459. It is a widely distributed species, and has been found in the North and South Atlantic and the North and South Pacific, but is for the most part a deep-sea form, with a range of depth in these oceans of 1000 to 2400 fathoms, although it has been collected on several occasions in shallow water.

Polymorphina gibba, d'Orbigny.

Obtained (rare) at one station only, 342, 1946 fathoms.

Polymorphina seguenzana, H. B. Brady.

Taken at Station 459, 1998 fathoms (rare).

Polymorphina oblonga, d'Orbigny.

Obtained at Station 346, 56 fathoms. This species has been taken in the North Pacific as low down as 2050 fathoms.

Genus Uvigerina, d'Orbigny.

Uvigerina brunnensis, Karrer.

I have obtained this form (rare) in the material from Station 342, 1946 fathoms. *U. brunnensis* is a rare species in the living state; its only known records are from Christmas Harbour, Kerguelen, 120 fathoms; and off the western shores of Patagonia, 245 fathoms.

Uvigerina aculeata, d'Orbigny.

Obtained at Stations 342 and 459 (not abundant).

Uvigerina pygmæa, d'Orbigny.

This is the most common species of the genus; it has been collected in all seas, and at all depths from 2 to 2600 fathoms. I have obtained it in fair numbers from Stations 451 (1741 fathoms) and 346 (56 fathoms).

Uvigerina asperula, Czjzek.

A few specimens of this species were taken at Station 459, 1998 fathoms. *U. asperula* is a comparatively common species, and has been found from as far north as lat. 56° and as far south as lat. 52°. It was obtained by the *Challenger* Expedition in the Antarctic at 2600 fathoms.

Uvigerina angulosa, Williamson.

This characteristic form was obtained in fair abundance at Station 346, 56 fathoms. It is a widely distributed form, and has been found as far north as lat. 70°, and as far south as the Antarctic Continent, in depths ranging from 8 to 1375 fathoms.

Family GLOBIGERINIDÆ, Ehrenberg.

Genus Globigerina, d'Orbigny.

Globigerina dutertrei, d'Orbigny.

This robust dwarfed variety apparently takes the place of *Globigerina bulloides* in the Antarctic Seas. I have found this species in smaller or greater numbers in most of the deposits obtained by the *Scotia* Expedition, at no less than fifteen of the twenty-four stations from which I have samples of the deposits, viz. Stations 286, 300, 313, 338, 342, 346, 387, 417, 418, 420, 421, 447, 451, 459, and 467.

Globigerina pachyderma (Ehrenberg).

Dr H. B. Brady, in describing this species, states that it has not been taken south of the Faroe Channel. I have examined a great number of specimens from the Faroe Channel, Arctic and Antarctic Seas, and Southern Ocean, and can find no specific characters differentiating those taken by the *Scotia* from those found in the Faroe Channel and Arctic Sea. I have obtained *Globigerina pachyderma* more or less abundantly from nine stations, viz. 300, 313, 338, 342, 346, 387, 417, 420, and 451.

Globigerina bulloides, d'Orbigny.

Obtained at eight stations, viz. 338, 342, 346, 417, 421, 451, 459, and 467. *Globigerina bulloides* is the most common species of the genus. It has been taken in

the living state by the plankton net wherever Foraminifera have been collected, all over the world, and their tests form marine deposits from almost every latitude, down to depths of nearly 3000 fathoms.

Globigerina inflata, d'Orbigny.

Obtained (fairly common) at Stations 342, 346, 451, 459, and 467.

Globigerina triloba, Reuss.

Obtained (few) at Stations 342, 459, and 467.

Globigerina digitata, H. B. Brady.

This delicate, beautifully formed variety was found (rare) at one station only, 459, 1998 fathoms. *G. digitata* is a rare species; its previous records are, three stations in the South Atlantic, and six in the South Pacific. The *Scotia* station is the most southern point at which this species has been collected; it is not known, so far as I am aware, from the North Atlantic.

Globigerina conglobata, H. B. Brady.

A few specimens of this species were found at Station 459.

Globigerina sacculifera, H. B. Brady.

A number of specimens of this large tropical form were obtained at Station 459. [It was also taken in plenty at Station 81, 18° 24′ S., 37° 58′ W., 36 fathoms, coral and sand.]

Globigerina dubia, Egger.

This thick-shelled variety was obtained (rare) at Station 421, 2487 fathoms; this is the most southerly record for the species.

Globigerina (Orbulina) universa, d'Orbigny.

A few small specimens of this common form were obtained from Station 459, 1998 fathoms, and in moderate numbers from Stations 118, 2¼, and 346, 56 fathoms.

Genus Pullenia, Parker and Jones.

Pullenia quinqueloba, Reuss.

This widely distributed species has been obtained from as far north as lat. 62° 6′ N., and southward to the Antarctic Continent. Its range of depth extends from 30 to 2750 fathoms. It is found in abundance in the Faroe Channel, and has been taken sparingly off the shores of the British Islands. I obtained *Pullenia quinqueloba* in moderate numbers from the deposit taken at Stations 459 and 467.

Pullenia sphæroides (d'Orbigny).

This cosmopolitan species was obtained (sparingly) from Stations 342, 420, 421, 447, 459, 467.

Pullenia obliquiloculata, Parker and Jones.

This species was found (rare) at Stations 447, 451, 459, and 467. *P. obliquiloculata* is found in all the deep-sea deposits, but attains its fullest development in the tropical and subtropical waters of mid-ocean. It has a comparatively wide distribution, but the *Scotia* records are the most southerly from which it has been collected.

Family *ROTALIDÆ.*

Sub-family SPIRILLININÆ.

Genus SPIRILLINA, Ehrenberg.

Spirillina obconica, H. B. Brady.

This pretty little species was found at Station 346, 56 fathoms, in moderate numbers. *S. obconica* has hitherto been collected at three other localities only: off Prince Edward Island, 50 to 150 fathoms; in Christmas Harbour, Kerguelen, 120 fathoms; and in Nares Harbour, Admiralty Islands, 17 fathoms.

Spirillina tuberculata, H. B. Brady.

A few specimens of this species were obtained at Station 346. Like the former species, *S. tuberculata* appears to flourish best in the Southern Ocean. I have collected it in the Faroe Channel; it is also recorded from one or two points off the British coast.

Sub-family ROTALINÆ.

Genus PATELLINA, Williamson.

Patellina corrugata, Williamson.

Obtained (rare) at Station 346, 56 fathoms. This species has been found as far as lat. 83° 19′ N., in 72 fathoms, and as far south as off Heard Island, 150 fathoms. I have taken it in the cold area of the Faroe Channel, in 365 fathoms.

Genus DISCORBINA, Parker and Jones.

Discorbina orbicularis (Terquem).

Found moderately common at Station 346, 56 fathoms.

Discorbina rarescens, H. B. Brady.

A few specimens also obtained at Station 346.

Discorbina concinna, H. B. Brady.

This species was also taken (rare) at Station 346.

Discorbina parisiensis (d'Orbigny).

Obtained sparingly at Station 346. It was collected in abundance by the *Challenger* off Kerguelen, 20 to 50 fathoms. *D. parisiensis* is also recorded from off the Irish coast, and the Atlantic shores of France.

Genus TRUNCATULINA, d'Orbigny.

Truncatulina tenera, H. B. Brady.

This rare little form was obtained from the deposits taken at Stations 342, 417, 451, 459, and 467. *T. tenera* would appear to prefer the deep water of the great ocean basins. Its other known localities are one station in the North Atlantic, off the Canaries, 620 fathoms; and three in the South Pacific, near the coast of Chili and Patagonia, 166 to 1375 fathoms.

Truncatulina pygmæa, Hantken.

Obtained (few) at Stations 300, 342, 420, 447, 459, and 467. *T. pygmæa* is a typical deep-sea species; it has been taken in the deposits from all the great ocean basins, whenever they have been examined for Foraminifera, down to 3125 fathoms.

The *Scotia* records are the most southerly points from which this species has been collected.

Truncatulina wuellerstorfi (Schwager).

This species occurred sparingly at Stations 300, 417, 420, and 421. *T. wuellerstorfi* is a common form in the deep-sea oozes all over the great oceans.

Truncatulina ungeriana (d'Orbigny).

This species was found sparingly at Stations 313, 1775 fathoms, and 467, 2645 fathoms.

Truncatulina lobatula (Walker and Jacob).

This most common and widely distributed species I have obtained sparingly at Stations 342, 346, 447, 451, 459, and 467.

Truncatulina dutemplei (d'Orbigny).

Taken sparingly at Stations 342, 1946 fathoms, and 459, 1995 fathoms.

Truncatulina robertsoniana, H. B. Brady.

This handsome species (rare) was obtained at Station 451, 1741 fathoms.

Truncatulina akoneriana (d'Orbigny).

Obtained (rare) at Station 459, 1998 fathoms. This is a world-wide species, and is often taken in very deep water.

Truncatulina tumidula, H. B. Brady.

Taken (rare) at Station 468, 2700 fathoms. This is a rare species, and has only been collected at one other locality—in the red clay south of the Canaries, from 2740 fathoms, where it was taken in fair numbers.

Truncatulina haidingerii (d'Orbigny).

A few specimens of this species were found at Station 468.

Truncatulina tenuimargo, H. B. Brady.

Obtained sparingly at Station 417, 1410 fathoms, the most southerly record for this species.

Truncatulina variabilis, d'Orbigny.

Taken (common) at Station 346, 56 fathoms. This wild-growing form is a common species in the warmer waters of the sub-tropical and temperate seas, in shallow water; it has, however, been obtained in depths above 2000 fathoms. I have taken this species as far north as the Faroe Channel.

Truncatulina rostrata, H. B. Brady.

A few specimens of this species were also obtained from Station 346. Its natural habitat is in the shallow water in the vicinity of coral reefs and islands; it has not been obtained north of the tropics.

Genus ANOMALINA, d'Orbigny.

Anomalina polymorpha, Costa.

Obtained (rare) at Stations 420, 2620 fathoms, and (few) 346, 56 fathoms. This species was found by the *Challenger* off Marion (Prince Edward) Island, 50 to 150 fathoms; at three stations in the North Atlantic, 390 to 450 fathoms; and at three points in the South Pacific, 210 to 410 fathoms. The *Scotia* records are therefore the most southerly points known for this species.

Anomalina grosserugosa (Gumbel).

Taken (rare) at Station 346, 56 fathoms.

Genus PULVINULINA, Parker and Jones.

Pulvinulina crassa (d'Orbigny).

This species was obtained at Stations 342 (few), 451 (rare), and 459 (few). *Pulvinulina crassa* has been taken as far north as lat. 54° 53′ N., in depths ranging from 725 to 2740 fathoms; at seven or more points in the South Atlantic, 420 to 2350 fathoms; and at many localities in the Pacific, from 150 to 2335 fathoms. The *Scotia* records are the most southerly from which the species has been obtained.

Pulvinulina canariensis (d'Orbigny).

This common and widely distributed species was found at Stations 342, 451, 459, 467, and 468 in fair numbers. *P. canariensis* is a pelagic form in the living state. Its distribution, however, is better seen from the dead tests or shells to be found in the deposits of the ocean floor.

Pulvinulina truncatulinoides (d'Orbigny).

Obtained at Stations 342, 459, 467, and 468 (not common). *P. micheliniana* is a pelagic species; it attains its fullest development in the warmer waters of the tropics, becoming dwarfed and stunted the farther north or south of the tropics it is found. The *Scotia* records are the most southerly known.

Pulvinulina exigua, H. B. Brady.

This minute species, whose natural habitat is in the deeper waters of mid-ocean, is never taken in any great numbers. It was found in the deposits from Stations 342 (few), 417 (common), 447 (few), 451, 459, 467, and 468 (few). The *Scotia* records are the farthest south that *P. exigua* has ever been collected.

Pulvinulina karsteni (Reuss).

Obtained (rare) at Station 447 only. The best examples of *P. karsteni* have been collected in the Arctic Seas, in shallow water; the *Scotia* station is the greatest depth that this species has been recorded from, and also the most southerly point.

Pulvinulina elegans (d'Orbigny).

Obtained (few) at Station 342.

Pulvinulina umbonata, Reuss.

Taken very sparingly at Station 346, 56 fathoms.

Pulvinulina favus, H. B. Brady.

This remarkable and comparatively rare species was taken at Station 459, 1998 fathoms, in its typical form, although somewhat dwarfed, with its test beautifully

ornamented with "honeycomb"-like reticulations. *P. favus* is a typical deep-water species, and is found most abundantly in the South Pacific, between the equator and lat. 42° 43′ S. The farthest north record of its occurrence is the *Challenger's*, about eight degrees north of the equator. The *Scotia* station is therefore the most southerly. Its bathymetrical range is from 1375 to 2600 fathoms.

Genus ROTALIA, Lamarck.

Rotalia soldanii, d'Orbigny.

Obtained at Stations 342 (common), 447 (rare), 467, and 468 (few). *R. soldanii* is a typical deep-sea form, and has a world-wide distribution, extending from lat. 60° N. to as far south as the Antarctic Continent.

Family *NUMMULINIDÆ.*

Sub-family POLYSTOMELLINÆ.

Genus NONIONINA, d'Orbigny.

Nonionina pompilioides (Fichtel and Moll).

This typical deep-water form was found sparingly at Stations 286, 342, 447, and 467. *N. pompilioides* has been collected from most of the deep-water areas all over the world.

Nonionina umbilicatula (Montagu).

This cosmopolitan form was taken at Stations 447, 451, 459, 467, and 468, although not in any numbers; its bathymetrical range extends from 30 to 3125 fathoms or deeper.

Nonionina stelligera, d'Orbigny.

A few specimens of this somewhat rare species were obtained from Station 417, 1410 fathoms; this is the farthest south record, and the greatest depth at which the species has been collected.

Nonionina boueana, d'Orbigny.

This shallow-water form was taken at Station 346, 56 fathoms, in moderate abundance.

Genus POLYSTOMELLA, Lamarck.

Polystomella striatopunctata (Fichtel and Moll).

This very common species was taken in quantities at Station 118, $2\frac{1}{4}$ fathoms.

Polystomella macella (Fichtel and Moll).

Obtained (common) at Station 118.

Polystomella imperatrix, H. B. Brady.

Taken (rare) at Station 118. *P. imperatrix* is by no means a common species, but is the largest and most handsome of all the *Polystomellæ*. So far as I am aware, it has not been found north of the equator.

Polystomella crispa (Linné).

This common cosmopolitan species was obtained in abundance at Station 346, 56 fathoms.

Polystomella verriculata, H. B. Brady.

This rare species was also taken very sparingly at Station 346. *P. verriculata* has hitherto only been found at two points on the west coast of Australia, namely, off East Moncœur Island, 38 fathoms; and in Curtis Strait, Queensland, by the *Challenger* Expedition.

COMPARATIVE VIEW OF THE MORE PROMINENT FORAMINIFERA OBTAINED FROM THE VARIOUS SAMPLES OF DEPOSITS EXAMINED.

As the material in most cases was insufficient to give a full representation of the Foraminiferal fauna, reference is made only to the main features of the groups actually found.

In the case of Stations 313 and 420, where the material was abundant, full lists are given. as these stations (with certain exceptions, referred to under the individual stations) may be taken as representative of the northern and southern parts of the glacial deposit area in the Weddell Sea.

Station 118, Stanley Harbour, Falkland Islands.

Depth $2\frac{1}{4}$ fathoms; bottom temperature 52° F. A dark brown mud with a greenish tint, containing 27 per cent. of lime from calcareous organisms of various kinds. The chief Foraminifera are *Bulimina elegantissima*, *Rotalia karsteni*, and *Polystomella striatopunctata*. *Proteonina difflugiformis*, *Trochammina nitida*, and *T. nana* represent the arenaceous forms.

Station 286, lat. 68° 11′ S., long. 34° 17′ W.

Depth 2488 fathoms; bottom temperature 31°·3 F. A greenish-gray unctuous glacial clay, gritty to the touch, containing 5 per cent. of lime.

An insufficient quantity of the deposit was available for a complete estimation of the Foraminiferal fauna. The only species found in the sample examined are *Cassidu-*

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lina subglobosa, *Globigerina dutertrei*, *G. pachyderma*, and *Nonionina pompilioides*. This station is not far from Station 291, which yielded a more extensive collection; and it is probable that, if a larger quantity of material had been obtained, it would have been found to be rich in the arenaceous types.

STATION 291, lat. 67° 33′ S., long. 36° 35′ W.

Depth 2500 fathoms. A greenish-gray gritty glacial mud with rock-fragments. The sample examined consisted of washings from the mud taken in the trawl, the finest mud and everything under $\frac{1}{24}$ inch in size being washed away.

The Foraminifera belong almost entirely to the Arenacea. *Astrorhiza crassatina* is present in abundance, together with *A. arenaria*, *Saccammina*, *Thurammina*, *Reophax*, *Hyperammina*, *Hormosina*, *Haplophragmoides*, and *Ammolagena*. The only calcareous form found was one or two specimens of *Miliolina bucculenta*.

STATION 295, lat. 66° 40′ S., long. 40° 35′ W.

Depth 2425 fathoms; bottom temperature 31°·3 F. A bluish-gray gritty glacial clay. Only a very small quantity came to me for examination, so that nothing definite can be said about the general facies of the Foraminiferal fauna. The only two species found were *Astrorhiza crassatina*, fragments, common, and *Hormosina globulifera*, a few specimens.

STATION 300, lat. 65° 29′ S., long. 44° 06′ W.

Depth 2500 fathoms; bottom temperature 32°·1 F. A fairly tough gray glacial clay with gritty particles, containing 2 per cent of lime.

A large amount of material was not available for examination, but the following Foraminifera were found:—*Proteonina difflugiformis*, *Haplophragmoides subglobosum*, *H. trulissatum*, *Cyclammina pusilla*, *Globigerina dutertrei*, *G. pachyderma*, and *Truncatulina pusilla*.

STATION 301, lat. 64° 48′ S., long. 44° 26′ W.

Depth 2485 fathoms; bottom temperature 31°·2 F. A dark grey glacial mud with rock-fragments. A trace of lime. Only a very small amount available for examination.

The Foraminifera found were *Saccammina sphærica* (attached to a rock-fragment), *Bathysiphon filiformis*, *Reophax nodulosa*, and *R. pilulifera*.

STATION 313, lat. 62° 10′ S., long. 41° 20′ W.

Depth 1775 fathoms; bottom temperature 31°·0 F. A bluish-gray, only slightly coherent glacial muddy sand, containing 2 per cent. of lime. The material obtained here from the trawl was large in amount, and, although a little of the finest material

may have been washed away, the following list of the Foraminifera obtained is probably fairly representative:—

Miliolina bucculenta, Br.
Astrorhiza crassatina, Br.
Pelosina cylindrica, Br.
Saccammina socialis, Br.
,, *sphærica*, Sars.
Psammosphæra fusca, Sch.
Rhabdammina abyssorum, Sars.
Saccorhiza ramosa (Br.).
,, *elongata* (Br.).
Reophax nodulosa, Br.
,, *pilulifera*, Br.
,, *dentaliniformis*, Br.
,, *membranacea*, Br.
Ammobaculites tenuimargo (Br.).
Haplophragmoides scitulum (Br.).
,, *rotulatum* (Br.).
Cribrostomoides bradyi, Cush.
Trochammina globigeriniformis (P. and J.).
Hormosina normani, Br.
Ammolagena clavata (P. and J.).
Cyclammina pusilla, Br.
Gaudryina pseudofiliformis, Cush.
Clavulina communis, d'Orb.
Cassidulina subglobosa, Br.
Globigerina dutertrei, d'Orb.
,, *pachyderma* (Ehrng.).
Truncatulina ungeriana, d'Orb.

The *Hormosina normani* from this station are exceptionally large, several specimens measuring fully $\frac{1}{4}$ inch across the final chamber. These were obtained from the washings of the mud taken by the trawl.

Station 337*a*, lat. 59° 46′ S., long. 48° 02′ W.

Depth 2110 fathoms. A brownish-gray sandy mud, on the border-line between a glacial deposit and a Diatom ooze, with 1 per cent. of lime. Only a small amount available for examination. The Foraminifera found, with the exception of one species, all belong to the Arenacea:—*Psammosphæra*, *Rhabdammina*, *Saccorhiza*, *Ammodiscus*, *Haplophragmoides*, *Proteonina*, *Trochammina*, *Ammobaculites*, *Clavulina*, *Spiroplecta*, and *Cristellaria*.

Station 338, lat. 59° 23′ S., long. 49° 08′ W.

Depth 2180 fathoms. A Diatom ooze or volcanic sand (there being a large amount of volcanic mineral particles mixed with the siliceous organisms). There is merely a trace of lime. The Foraminifera found in the small amount available would indicate a fairly rich Rhizopod fauna. The arenaceous forms are represented by *Rhizammina*, *Proteonina*, *Cyclammina*, *Ammobaculites*, and *Gaudryina*; the pelagic forms by dwarfed *Globigerina bulloides*, *G. dutertrei*, and *G. pachyderma*.

Station 342, lat. 56° 54′ S., long. 56° 24′ W.

Depth 1946 fathoms. A fine-grained Globigerina ooze containing 24 per cent. of lime. There are numerous volcanic mineral particles.

This deposit gave a rich Foraminiferal fauna, no less than twenty-nine genera and sixty species being obtained. The Miliolidæ are represented by three genera, *Biloculina*, *Miliolina*, and *Spiroloculina*. Among the arenaceous types, which are represented by twelve genera, the more rare species *Marsipella cylindrica*, *Proteonina difflugiformis*, *Thurammina albicans*, and *Globotextularia anceps* are

noteworthy. Textularidæ, by *Textularia*, *Gaudryina*, *Verneuilina*, *Ehrenbergina*, *Clavulina*, and *Cassidulina*, 9 species of *Lagena*, 1 *Nodosaria*, 1 *Cristellaria*, 2 *Polymorphina*, 2 *Uvigerina*, 5 *Globigerina*, with 1 *Pullenia*. Amongst the Rotalidæ, 4 *Truncatulina*, 5 *Pulvinulina*, 1 *Rotalia*. Lastly, 1 *Nonionina*—*i.e.* practically all the types peculiar to a Globigerina ooze, of the South Atlantic and Southern Ocean.

STATION 346, lat. 54° 25′ S., long. 57° 32′ W.

On the Burdwood Bank, depth 56 fathoms. The trawl brought up a large number of masses of calcareous, shelly, and Foraminiferal sand with large colonies of *Cephalodiscus agglutinans*; and from these no fewer than eighty species belonging to twenty-five different genera of Foraminifera were obtained. With a few exceptions, they are all of typical Antarctic shallow-water character, but arenaceous types are conspicuous by their absence, being represented by *Trochammina nitida* only.

The Miliolinidæ are well represented by six genera and fourteen species, of which *Nubecularia bradyi*, *Miliolina ferussacii*, and *Articulina funalis* are typical Antarctic species; while it is of interest to have found here also *Cornuspira foliacea*, although of comparatively small size, which occurs widely but reaches its best development in the North Atlantic and North Sea.

The Textularidæ are well represented by several species of *Bulimina*, *Cassidulina*, and *Ehrenbergina*. The *Lagenæ* alone yield twenty-four species, the most common being *L. gracilis*. Of the rarer species may be mentioned *L. trigonomarginata*, *L. hispida*, and *L. castrensis*. *Nodosaria* gave five species; *Cristellaria* four species; *Polymorphina* two, *Uvigerina* two, and *Globigerina* five.

The most abundant species observed in the sample are *G. bulloides* (typical), *G. dutertrei*, *Truncatulina variabilis*, and *Polystomella crispa*. Three new species are described, viz. *Lagena hispidipholus*, *Polymorphina inflata*, and *Miliolina dentistoma*.

STATION 387, lat. 65° 59′ S., long. 33° 06′ W.

Depth 2625 fathoms. A brown tenacious glacial clay, with a trace of lime. In the small sample the only Foraminifera found are *Proteonina difflugiformis*, *Globigerina dutertrei*, and *G. pachyderma*.

STATION 416, lat. 71° 22′ S., long. 18° 15′ W.

Depth 2370 fathoms; bottom temperature 31°·5 F. A greenish-gray unctuous glacial clay, with a trace of lime. Some two ounces of deposit yielded five genera of arenaceous Foraminifera, viz. *Psammosphæra*, *Gordiammina*, *Reophax*, *Haplophragmoides*, and *Cyclammina*. No pelagic or porcellanous forms were found.

STATION 417, lat. 71° 22′ S., long. 16° 34′ W.

Depth 1410 fathoms; bottom temperature 31°·9 F. A greenish-gray glacial mud, with rock-fragments and glauconite grains, containing 4 per cent. of lime.

Foraminifera fairly well represented, especially the larger arenaceous types, such as *Rhabdammina*, *Psammosphæra*, *Saccammina*, *Pelosina*, *Saccorhiza*, *Reophax*, *Hormosina*, *Tolypammina*, *Haplophragmoides*, *Trochammina*, *Cyclammina*, several Textularidæ, several *Lagenæ*. *Globigerinæ*, tolerably abundant, especially the small, rounded variety *G. bulloides* and *G. dutertrei*, together with *Truncatulina wuellerstorfi*, *T. tenuimargo*, *T. tenera*, *Pulvinulina exigua*, and *Nonionina stelligera*.

Station 418, lat. 71° 32′ S., long. 17° 15′ W.

Depth 1221 fathoms; bottom temperature 31°·9 F. A glacial clay similar to that from Station 417. Here also the quantity of material was insufficient to give a full idea of the Foraminiferal fauna which may be expected to exist in this locality. Those obtained are:—*Bathysiphon filiformis*, *Psammosphæra fusca*, *Reophax nodulosa*, *Haplophragmoides rotulatum*, *Cribrostomoides bradyi*, *Clavulina communis*, *Virgulina schreibersiana*, *Globigerina dutertrei*, and *Cristellaria convergens*.

Station 420, lat. 69° 33′ S., long. 15° 19′ W.

Depth 2620 fathoms; bottom temperature 31°·5 F. A brownish-gray gritty glacial mud or clay. No lime in the sounding-tube sample. Some two pounds weight of this deposit were prepared for examination, including trawl washings. The washing away of the finest material from these may account for the absence of the more minute Textularidæ and Lagenidæ which one might expect to obtain from this locality; but the richness in arenaceous species makes it desirable to print *in extenso* the species obtained from this locality and extremely far south station. Several species show a high development in form and size, especially in *Reophax*, *Psammosphæra*, and *Hormosina*. Most of the more prominent genera of the Astrorhizidæ are represented, and no fewer than seven new species and a new variety are described.

List of Foraminifera from Station 420.

Biloculina ringens (Lamk.).
,, *depressa*, d'Orb.
Miliolina bucculenta, Br.
,, *circularis* (Born.).
,, *bucculenta*, var. *placentiformis*, Br.
Keramosphæra murrayi, Br.
Saccammina sphærica, M. Sars.
,, *socialis*, Br.
Sorosphæra confusa, Br.
Psammosphæra fusca, Sch.
Astrorhiza arenaria, Norm.
Pelosina arborescens, sp. nov.
,, *cylindrica*, Br.
Syringammina minuta, sp. nov.
Tholosina bulla (Br.).
Technitella raphanus, Br.
Technitella asciformis, sp. nov.
Rhizammina indivisa, Br.
Rhabdammina discreta, Br.
,, *cornuta*, Br.
Bathysiphon filiformis, M. Sars.
Hyperammina friabilis, Br.
,, *subnodosa*, Br.
Saccorhiza ramosa (Br.).
Achomonella catenata, Norm.
,, *ramuliformis*, Br.
Reophax nodulosa, Br.
,, *pilulifera*, Br.
,, *adunca*, Br.
,, *robustum*, sp. nov.
Hormosina globulifera, Br.
,, *irregularis*, sp. nov.

List of Foraminifera from Station 420—continued.

Webbinella hemisphærica (P. and J.).	*Cyclammina cancellata*, Br.
Crithionina pisum, var. *hispida*, Flint.	,, *pusilla*, Br.
Thurammina papillata, Br.	,, *contorta*, sp. nov.
,, *favosa*, var. *reticulata*, var. nov.	*Ammobaculites tenuimargo* (Br.).
Tolypammina vagans (Br.).	*Placopsilina vesicularis*, Br.
Ammolagena clavata (P. and J.).	*Globigerina dutertrei*, d'Orb.
Haplophragmoides trullissata (Br.).	,, *pachyderma* (Ehrng.).
,, *glomeratum* (Br.).	*Pullenia sphæroides* (d'Orb.).
,, *rotulatum* (Br.).	*Truncatulina wuellerstorfi* (Sch.).
,, *umbilicatum*, sp. nov.	,, *pygmæa*, Hantk.
,, *subglobosum* (G. O. S.).	*Anomalina polymorpha*, Costa.
Cribrostomoides bradyi, Cushn.	

Station 421, lat. 68° 32′ S., long. 10° 52′ W.

Depth 2487 fathoms; bottom temperature 31°·5 F. A glacial clay similar to that from Station 420, but containing 5 per cent of lime. Only a small quantity was received for examination, in which the following were observed:—*Globigerina bulloides*, *G. dutertrei*, *G. dubia*, *Pullenia sphæroides*, and *Truncatulina wuellerstorfi*.

Station 438, lat. 56° 58′ S., long. 10° 03′ W.

Depth 2518 fathoms. A Diatom ooze with a large amount of volcanic mineral particles. Slight traces of lime.

Only a very small quantity was sent me, and the only Foraminifera found were one specimen of *Cyclammina pusilla* and a few *Globigerina dutertrei*.

Station 447, lat. 51° 07′ S., long. 9° 31′ W.

Depth 2103 fathoms. A typical Diatom ooze containing 9 per cent of lime.

Foraminifera well represented, including: 2 Miliolidæ, 11 genera of the arenaceous types, 3 Textularidæ, 4 species of *Lagena*, including the rare forms *L. staphyllearia* and *L. feildeniana*; *Globigerina dutertrei* moderately abundant; 3 species of *Pullenia*, 2 of *Truncatulina*, 2 of *Pulvinulina*, 1 *Rotalia*, and 2 of *Nonionina*.

Station 451, lat. 48° 06′ S., long. 10° 05′ W.

Depth 1741 fathoms. A deposit transitional in type between Diatom ooze and Globigerina ooze, containing 55 per cent. of lime and 30 per cent. of siliceous organisms.

The Globigerinidæ are the predominating types present, the only two arenaceous forms found being *Proteonina difflugiformis* and *Gordiammina charoides*. The characteristic feature of the Foraminifera from this station is the presence of the more northern types, such as *Bolivina nobilis*, *B. reticulata*, *Bulimina aculeata*, *B. buchiana*,

Uvigerina pygmæa, *Truncatulina lobatula*, *Pulvinulina canariensis*, and *P. crassa*, with *Nonionina umbilicatula*.

Station 459, lat. 41° 30′ S., long. 9° 55′ W.

Depth 1998 fathoms. A typical South Atlantic fine-grained Globigerina ooze, containing 71 per cent of lime.

Only a small quantity available for examination, but this yielded a somewhat long and interesting list of Foraminifera. Amongst the most noteworthy of these are as follows:—The strictly arenaceous types are but sparingly represented, *Reophax distans*, *Proteonina difflugiformis*, *Cribrostomoides bradyi*, *Ammochilostoma galeata*, and *Spiroplecta americana*; 9 species of Miliolininæ—amongst these are *Biloculina serrata*, *B. murrhyna*, and *B. tubulosa*, all deep-sea types. Textularidæ are represented by 9 species, and Lagenidæ by no less than 23 species, among which may be noted as the rarer forms *L. stelligera*, *L. feildeniana*, and *L. truncata*. The Globigerinidæ, which make up the greater portion of this deposit, are represented by 11 species; the small varieties of *G. bulloides* and *G. dutertrei* are by far the most abundant. *G. sacculifera*, *G. conglobata*, and *Pullenia obliquiloculata*, with *Pulvinulina micheliniana*, and *P. canariensis*, types of the warmer-water areas of tropical seas, are met with here in a more or less dwarfed and stunted condition.

Station 467, lat. 40° 08′ S., long. 1° 50′ E.

Depth 2645 fathoms. A Globigerina ooze containing 46 per cent of lime. A considerable variety of Foraminifera was obtained from this deposit, though the specimens are few in numbers, and of small dimensions individually. The genera represented are *Biloculina*, *Miliolina*, *Proteonina*, *Cribrostomoides*, *Cyclammina*, *Ammobaculites*; *Textularia*, *Gaudryina*, *Bolivina*, *Virgulina*, *Cassidulina*, and *Lagena*, which are represented by ten species chiefly of the smaller deep-water types; also *Nodosaria* and *Cristellaria*, *Globigerina* by four species, with *Pullenia*, *Truncatulina*, *Pulvinulina*, *Rotalia*, and *Nonionina*.

Station 468, lat. 39° 48′ S., long. 2° 33′ E.

Depth *circa* 2645 fathoms. This deposit is somewhat similar in composition to that obtained at Station 467, but with only 40 per cent of lime. The Foraminifera obtained here are fewer, with regard to the bottom-living forms. *Globigerina bulloides* and *G. inflata*, however, are more abundant, while *Truncatulina* would appear to take the place of *Lagena*, so far as numbers of species go. The arenaceous types are represented by *Psammosphæra fusca*, *Rhabdammina discreta*, and *Proteonina difflugiformis*, while the higher forms are absent.

APPENDIX.

List of Foraminifera obtained from Station 81, Lat. 18° 24′ S., Long. 37° 58′ W., on the Abrolhos Bank, off the Coast of Brazil.

The sounding-tube went down on hard ground and came up empty. From the deposit taken in the dredge, which was very much torn, and from the attached swabs, the following Foraminifera were obtained, along with other organisms:—

Family *MILIOLIDÆ*.

Sub-family MILIOLININÆ.

Genus Biloculina, d'Orbigny.

Biloculina ringens (Lamarck).

A few of this cosmopolitan species. Also found at three other *Scotia* stations.

Biloculina lævis (Defrance).

A few specimens of this somewhat rare form.

Genus Spiroloculina, d'Orbigny.

Spiroloculina limbata, d'Orbigny.

Rare. Also found at Station 342.

Genus Miliolina, Williamson.

Miliolina separans, H. B. Brady.

Rare.

Miliolina sclerotica (Karrer).

Rare.

Miliolina seminulum (Linné).

A few examples of this very common species. Also found at Station 346.

Sub-family HAUERININÆ.

Genus Articulina, d'Orbigny.

Articulina sulcata, Reuss.

A few specimens of this form, whose natural habitat is in comparatively shallow water in the vicinity of coral islands in tropical and sub-tropical seas.

Sub-family PENEROPLIDINÆ.

Genus Peneroplis, Montfort.

Peneroplis pertusus (Forskål).

Specimens of the narrow compressed variety (*Peneroplis arietinus* (Batsch)) were found in moderate numbers. This species is one of the most common Foraminifera in the shallow waters of tropical seas, and is found as far north as the Mediterranean.

Family *ASTRORHIZIDÆ*.

Sub-family HYPERAMMININÆ.

Genus Sagenina, Chapman.

Sagenina frondescens (H. B. Brady).

A few specimens of this interesting parasitic species were found attached to calcareous algæ and shell-fragments. It is a more or less common form in the shallow waters of the eastern tropical seas, more especially in the areas of coral reefs and islands, but is worthy of note to have been obtained off the coast of Brazil.

Family *TEXTULARIIDÆ*.

Sub-family TEXTULARIINÆ.

Genus Textularia, Defrance.

Textularia conica, d'Orbigny.

A few specimens. This species is widely distributed, especially in the coral seas of tropical and sub-tropical regions. It was also obtained at Station 342.

Sub-family VERNEUILININÆ.

Genus Verneuilina, d'Orbigny.

Verneuilina spinulosa, Reuss.

Rare. This species is well known as a tropical or sub-tropical shallow-water form.

Genus Clavulina, d'Orbigny.

Clavulina parisiensis, d'Orbigny.

A few specimens. This species is a common form in West Indian seas, in comparatively shallow water. A fine-grained smooth variety was obtained by the *Challenger* in the North Pacific in 3125 fathoms.

Family *LAGENIDÆ.*

Sub-family NODOSARINÆ.

Genus CRISTELLARIA, Lamarck.

Cristellaria rotulata (Lamarck).

A few specimens of this fine species, which has a wide distribution, extending from as far north as lat. 79° 45′ to as far south as Tierra del Fuego. Its range of depth is from the littoral zone to 2200 fathoms. I have taken the species in its fullest development in the Faroe Channel, in 555 fathoms.

Cristellaria tenuis (Bornemann).

Rare.

Family *GLOBIGERINIDÆ.*

Genus GLOBIGERINA, d'Orbigny.

Globigerina bulloides, d'Orbigny.

Common.

Globigerina sacculifera, H. B. Brady.

Common.

Globigerina rubra, d'Orbigny.

Common.

Globigerina (*Orbulina*) *universa*, d'Orbigny.

A few.

Family *ROTALIDÆ.*

Sub-family ROTALINÆ.

Genus CYMBALOPORA, Hagenow.

Cymbalopora (*Tretomphalus*) *bulloides* (d'Orbigny).

A few specimens of this curious form. Not known outside the tropical and subtropical seas; as a pelagie form it has been taken in great numbers in the regions of coral reefs and islands.

Genus TRUNCATULINA, d'Orbigny.

Truncatulina reticulata (Czjzek).

In fair numbers.

Genus CARPENTERIA, Gray.

Carpenteria utricularis, Carter.

Rare. A tropical shallow-water form, always found adhering to various marine organisms.

Genus PULVINULINA, Parker and Jones.

Pulvinulina canariensis (d'Orbigny).

A few. Found at several other *Scotia* stations.

Pulvinulina oblonga (Williamson).

A few.

Pulvinulina repanda (Fichtel and Moll).

A few specimens of this common shallow-water form.

Pulvinulina elegans (d'Orbigny).

A few. Also found at Station 342.

Pulvinulina umbonata, Reuss.

Also at Station 346.

Sub-family TINOPORINÆ.

Genus GYPSINA, Carter.

Gypsina globulus (Reuss).

Small numbers of this interesting shallow-water form were obtained.

Genus POLYTREMA, Risso.

Polytrema miniaceum (Pallas).

Common attached to shell-fragments, etc. This species is a common shallow-water form in temperate and tropical seas. Although mainly found in shallow water, it was collected by the *Challenger* naturalists in the Atlantic at a depth of 1000 fathoms. With other adherent Foraminifera, it plays an important part in building up the limestone rocks of coral reefs and islands.

Genus HOMOTREMA, Hickson.

Homotrema rubrum (Lamarck).

Rare.

Genus SPORADOTREMA.

Sporadotrema cylindricum (Carter).

Fragments of the basal and distal portions of this large parasitic form are of interest from this locality.

Family *NUMMULINIDÆ.*

Sub-family POLYSTOMELLINÆ.

Genus Nonionina, d'Orbigny.

Nonionina umbilicatula (Montagu).

Common. Also found at several other *Scotia* stations.

Sub-family NUMMULITINÆ.

Genus Amphistegina, d'Orbigny.

Amphistegina lessonii, d'Orbigny.

Common.

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EXPLANATION OF PLATES.

Plate I.

Figs. 1–3, *Pelosina arborescens*, n. sp.

Fig. 1. General aspect of the test of a living specimen, showing the oral apertures of seven of the arborescent tubes surrounded by sarcode and expanded pseudopodia. From Loch Fyne, west coast of Scotland, 107 fathoms. × 2.

Fig. 2. Portion of test from near the base of the arborescent tubes, laid open to show the thickness of the walls. × 8.

Fig. 3. Transverse section across the tubular neck of test, filled with granulated sarcode, viewed by transmitted light. × 15.

Figs. 4–5, *Pelosina arborescens*, n. sp.

Fig. 4. A broken specimen with fragments in position; the spaces between indicate where fracture took place. From Station 420, Weddell Sea, 2620 fathoms. × 5.

Fig. 5. A portion of the test from near the base of the branching tubes, open transversely, showing the thickness and character of the wall. × 6.

Figs. 6–10, *Reophax robustus*, sp. nov.

Figs. 6, 7, 8 represent three stages of development, and show the robust external character of test, and selective power shown by the organism of the building material. × 25.

Fig. 9. Younger specimen with test laid open longitudinally to show interior and comparative smoothness of the chambers. × 25.

Fig. 10. End view of last chamber to show aperture. × 25.

Figs. 11–12, *Thurammina favosa*, var. *reticulata*, var. nov

Fig. 11. Showing general aspect of test. × 25.

Fig. 12. A specimen laid open to show thickness of wall and the smooth interior. × 25.

Figs. 13–15, *Hormosina irregularis*, n. sp.

Fig. 13. Specimen showing the lateral aspect of test and the irregularity in forming the chambers. × 25.

Fig. 14. Younger specimen composed of two chambers only. × 25.

Fig. 15. Specimen with one chamber laid open to show the thickness of wall, and aperture from the interior side. × 25.

Plate II.

Figs. 1–2, *Syringammina minuta*, sp. nov.

Fig. 1. Specimen showing general aspect, attached to a crystal of quartz (sercone), with tubular offshoots, adding to the rigidity of the test. × 30.

Fig. 2. Portion of a radial section, showing at *a a* the concentric reticulated portions. × 50.

Figs. 3–4, *Technitella asciformis*, sp. nov.

Fig. 3. Specimen showing lateral aspect. × 30.
Fig. 4. Oral end of the test, showing grooved neck and everted lip. × 35.

Figs. 5–7, *Cyclammina contortum*, sp. nov.

Fig. 5. Typical specimen, showing lateral aspect. × 25.
Fig. 6. Showing peripheral aspect. × 25.
Fig. 7. Specimen laid open horizontally to show the internal structure. × 30.

Figs. 8–10, *Haplophragmoides umbilicatum*, sp. nov.

Fig. 8. Typical specimen, showing lateral aspect. × 30.
Fig. 9. Peripheral aspect. × 25.
Fig. 10. Specimen laid open horizontally to show internal structure. × 30.

Figs. 11–13, *Lagena hispidipholus*, sp. nov.

Fig. 11. Specimen showing superior aspect. × 35.
Fig. 12. Specimen showing inferior aspect. × 40.
Fig. 13. A subangular variety with keeled margin. × 35.

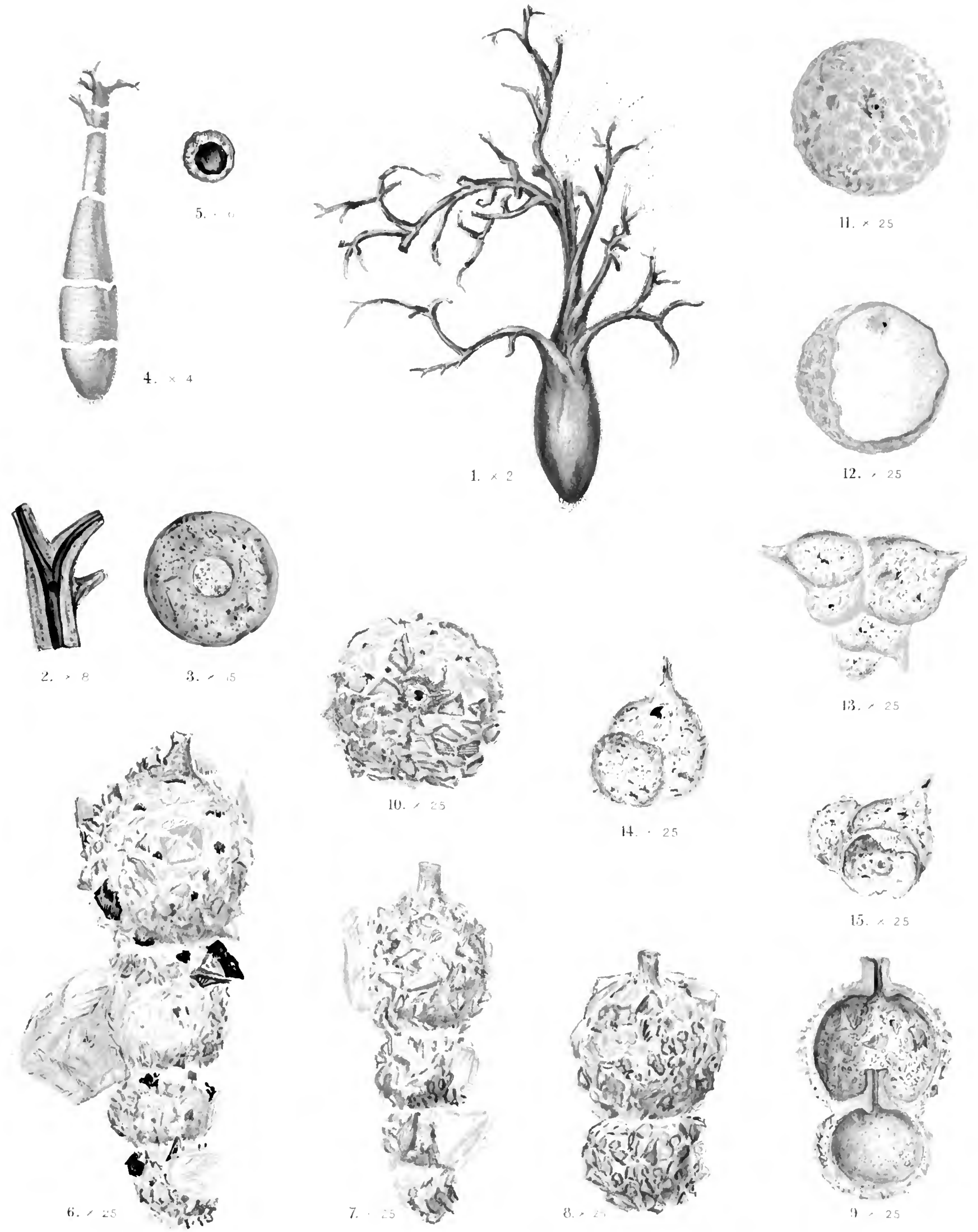
Figs. 14–16, *Polymorphina inflata*, sp. nov.

Figs. 14, 15. Lateral aspect. × 30.
Fig. 16. Oral aspect. × 30.

Figs. 17–19, *Miliolina dentistoma*, sp. nov.

Figs. 17, 18. Lateral aspect. × 30.
Fig. 19. Oral aspect. × 30.

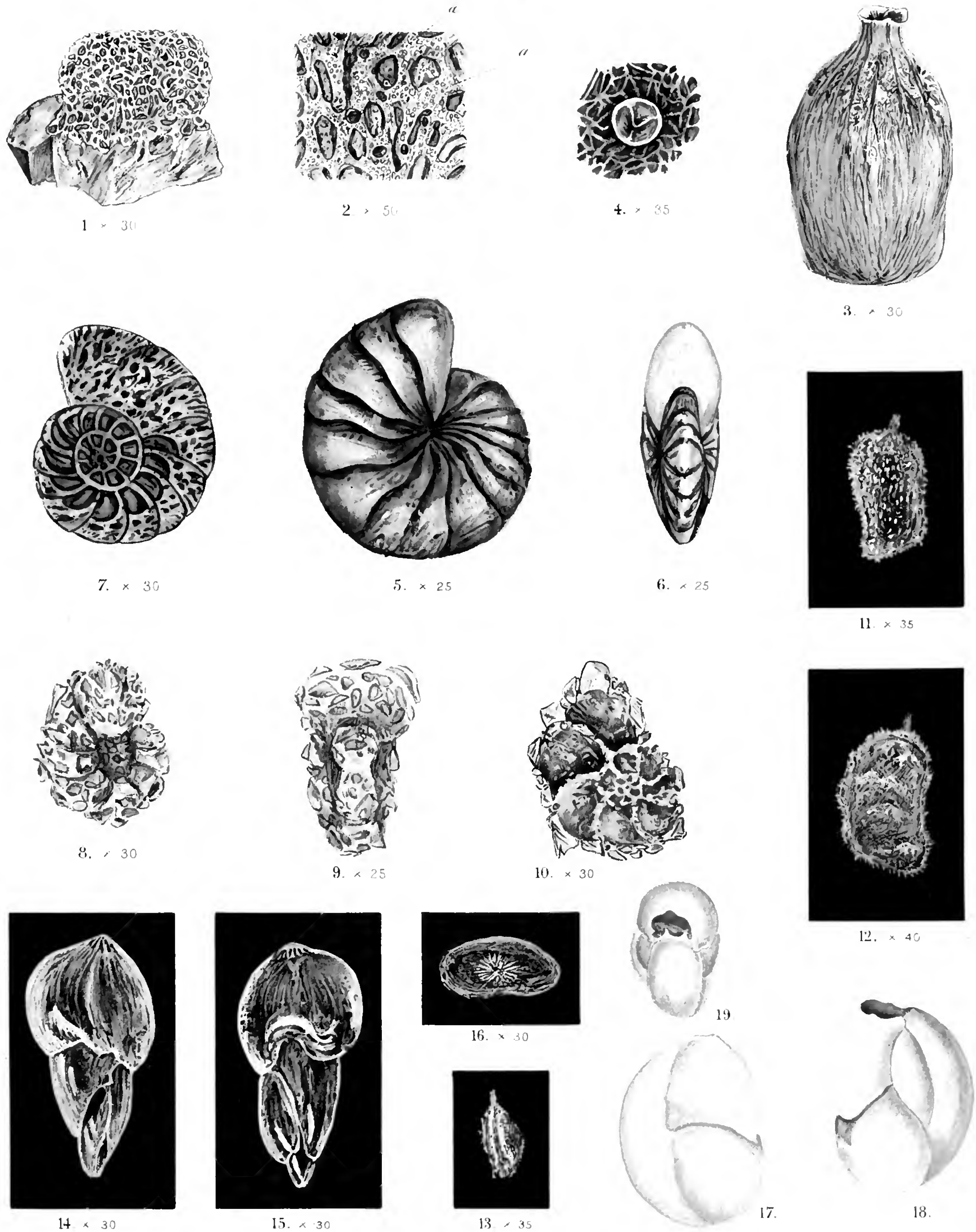
PEARCEY: "SCOTIA" FORAMINIFERA—PLATE I



F. J. M. C. Pearcey, del. ad Nat.

M'Farlane & Erskine, Lith., Edin.

PEARCEY: "SCOTIA" FORAMINIFERA—PLATE II.



F. J. M. C. Pearcey, del. ad Nat.

MFarlane & Erskine, Lith., Edin.

PART VII.

SCHIZOPODA, STOMATOPODA, AND NON-ANTARCTIC ISOPODA.

VII.—THE SCHIZOPODA, STOMATOPODA, AND NON-ANTARCTIC ISOPODA OF THE SCOTTISH NATIONAL ANTARCTIC EXPEDITION.

By WALTER M. TATTERSALL, D.Sc.,
Keeper of the Manchester Museum.

(*WITH ONE PLATE.*)

VII.—The Schizopoda, Stomatopoda, and non-Antarctic Isopoda of the Scottish National Antarctic Expedition. By Walter M. Tattersall, D.Sc., Keeper of the Manchester Museum. *Communicated by* Dr J. H. Ashworth. (With One Plate.)

(MS. received June 5, 1913. Read July 7, 1913. Issued separately November 18, 1913.)

The present report deals with the whole of the Schizopoda and Stomatopoda in the *Scotia* collections, and with those Isopoda which were taken in localities outside the limits of Antarctica. I am indebted to the courtesy of Dr W. S. Bruce for the opportunity of examining and reporting on these collections. The report on the Antarctic Isopoda is being prepared by Mr T. V. Hodgson.

I also include a few notes on a small collection of Schizopoda which were taken by the *Discovery* on its outward journey to the South Pole, for the opportunity of examining which I am indebted to the kindness of Dr W. T. Calman, of the British Museum. These latter records are most appropriately included here along with those of the species which the *Scotia* captured on her outward journey, over very nearly the same ground. A comparison is thus possible between the captures of the two expeditions over the same ground and in two different years, and may be brought out in the following lists:—

Scotia. Nov. 1902–Jan. 1903.	*Discovery.* Sept. and Oct. 1901.
Siriella Thompsonii.	*Siriella Thompsonii.*
Thysanopoda tricuspidata.	*Thysanopoda tricuspidata.*
Euphausia americana.	*Euphausia Krohnii.*
,, *brevis.*	,, *americana.*
,, *tenera.*	,, *brevis.*
,, *hemigibba.*	,, *recurva.*
,, *pseudogibba.*	,, *tenera.*
Thysanoëssa gregaria.	,, *hemigibba.*
Nematoscelis microps.	,, *gibboides.*
	,, *lucens.*
	,, *longirostris.*
	Thysanoëssa gregaria.
	Stylocheiron carinatum.

No fewer than seven of the species are common to the two lists, and these represent the most abundant species in the tropical Atlantic Ocean.

Turning to the Antarctic Schizopoda, the results of the *Scotia* may be compared with those of other expeditions in the form of a table, as follows:—

Species.	French Expedition.	*Belgica.*	*Discovery.*	Swedish Expedition.	*Scotia.*
Euphausia superba, Dana	×	×	×	×	×
,, *longirostris*, Hansen		×		×	
,, *triacantha*, H. and T.			×	×	
,, *frigida*, Hansen			×	×	
,, *crystallorophias*, H. and T.		×	×		
,, *Vallentini*, Stebb.			×	×	
Thysanoëssa macrura, Sars	×	×	×	×	×
,, *vicina*, Hansen			×	×	
Eucopia australis, Dana				×	×
Hansenomysis antarctica, H. and T.			×	×	
Antarctomysis maxima, H. and T.	×	×	×	×	×
,, *Ohlinii*, Hansen			×	×	
Pseudomma Belgicæ, H. and T.		×	×	×	
Dactylamblyops Hodgsoni, H. and T.			×		
Mysidetes posthon, H. and T.			×	×	
Boreomysis distinguenda, Hansen					×
,, *Brucei*, W. M. T.					×

I have taken the average limits of free and floating ice as the boundaries of the Antarctic Regions. This limit for the South Polar waters was laid down by Dr BRUCE* in 1894, and is shown on a chart of the South Polar regions published by the British Admiralty.

The French Expedition (*Français*) had its headquarters at Graham Land, a little to the west of the Weddell Sea. The Schizopoda were described by COUTIÈRE (1906).

The *Belgica* worked a little further to the west of the *Français*. The Schizopoda were described by HANSEN (1908).

The *Discovery* had its winter quarters at the opposite side of the Pole to the *Scotia*, at Victoria Land. The Schizopoda were described by HOLT and TATTERSALL (1906), and TATTERSALL (1908).

The Swedish Antarctic Expedition (*Antarctic*), under NORDENSKJÖLD, explored the region to the east of Graham Land, between the ground worked by the *Scotia* and the *Français*. The results, as far as the Schizopoda are concerned, have not yet been published; but HANSEN, in several of his recent papers, has recorded various species belonging to the material of that expedition, and I have abstracted such records for the purposes of the above table. (See note, p. 204.)

It will be seen, therefore, that the recent expeditions to the Antarctic have explored that ocean between the Weddell Sea westwards to Victoria Land, about half the South Polar Ocean, and we have a fair knowledge of the Schizopod fauna of that area. The German Expedition (*Gauss*) had its headquarters half way between those of the *Scotia* and *Discovery*, in about lat. 90° E., in the centre of the unexplored eastern

* "Antarctic Birds," *Knowledge*, September 1, 1894.

part of the Antarctic Ocean, but I am not aware that any account of the Schizopods has yet been published.

The above table includes seventeen species of Schizopoda—a complete list of the known purely Antarctic forms, as far as I am aware. (See note, p. 204.)

Of these seventeen, three are more or less circumpolar—*Euphausia superba*, *Thysanoëssa macrura*, and *Antarctomysis maxima*—having been recorded from the collections of most of the recent expeditions. Of the remainder, the following species, captured by the *Discovery* and the Swedish Expedition at almost opposite sides of the South Polar Ocean, will probably be found ultimately to be circumpolar in their distribution, viz. :—

Euphausia triacantha.
,, *frigida.*
,, *crystallorophias.*
,, *Vallentini.*
Thysanoëssa vicina.
Hansenomysis antarctica.
Antarctomysis Ohlinii.
Pseudomma Belgicæ.

Eucopia australis, captured by the *Scotia* and the Swedish Expedition, was not taken by the *Discovery*; but the type locality is quite near to Victoria Land, and the species is in all probability circumpolar. This gives a total of twelve species, out of seventeen known from the Antarctic Ocean, with a circumpolar distribution in that ocean, leaving only five whose present known distribution is limited.

The Schizopoda, therefore, present very clear evidence of a group which is, as a whole, circumpolar in its distribution in Antarctic waters.

The *Scotia* discovered only one new species, *Boreomysis Brucei*.

The Isopoda entrusted to me for identification include those taken by the *Scotia* on the outward and homeward journeys, mainly at the Falkland Islands and at the Cape, together with three species of parasitic Isopoda found on pelagic Decapoda and Schizopoda captured in tow-nets in the open ocean. The collection as a whole calls for very little comment, the recent work of STEBBING on the Crustacea of the Falkland Islands and South Africa covering nearly all the ground. In common with most workers called upon to identify isolated specimens of Sphæromidæ from distant localities, I have experienced considerable difficulty with this group. I have been obliged, as a result of my work, to establish two new species, which I hope will not add to the state of chaos in which the group remains at present. Dr BRUCE was also fortunate in rediscovering *Exosphæroma tristense*, of LEACH, a species which has remained in obscurity since its discovery nearly a century ago. I have redescribed the species, and figured, for the first time, the adult male. A third new species among the Isopoda is established for a specimen of the family Arcturidæ found at the Cape, which appears to be very distinct from any hitherto known form.

Finally, I desire to express my thanks to Dr Bruce for entrusting me with this collection, for much help with the literature, and for many courtesies in other ways; and to Dr W. T. Calman for allowing me to examine the collection of extra-Antarctic Schizopoda made by the *Discovery*, and for permission to include the records here.

Order MYSIDACEA, Boas.

Family Lophogastridæ, G. O. Sars.

Genus *Gnathophausia*, W. Suhm.

Gnathophausia gigas, W. Suhm.

Scotia.

Station 450, lat. 48° 00′ S., long. 9° 50′ W., South Atlantic, 1332 fathoms, trawl.—One female, 160 mm.

This specimen, which is in a rather poor state of preservation, is the largest recorded one belonging to the species, the previous largest, the *Challenger* specimen, measuring 142 mm. It differs from Sars' description and figures mainly in the less pronounced teeth on the antennal scale and in the less produced infero-posterior corners of the carapace. Both of these slight differences are due to age, and the specimen otherwise agrees with *G. gigas* so closely that I have no hesitation in ascribing it to this species.

Family Eucopiidæ, G. O. Sars.

Genus *Eucopia*, Dana.

Eucopia australis, Dana.

Scotia.

Station 398, lat. 68° 25′ S., long. 27° 10′ W., Antarctic Ocean, vertical tow-net, 0–1000 fathoms.—One female, 50 mm.

Station 414, lat. 71° 50′ S., long. 23° 30′ W., Weddell Sea, 2102 fathoms, vertical tow-net, 0–1000 fathoms.—One female, 35 mm.; one fragmentary specimen, tail end only.

Station 450, lat. 48° 00′ S., long. 9° 50′ W., South Atlantic, 1332 fathoms, trawl.—One female, 45 mm.

Station 468, lat. 39° 48′ S., long. 2° 33′ E., South Atlantic, 2645 fathoms, trawl.—One fragmentary specimen, head end only.

These specimens are in poor condition, but appear to belong, with very little doubt, to *E. australis* as redefined by Hansen (1905*c*).

Family MYSIDÆ, Dana.

Sub-family BOREOMYSINÆ, Holt and Tattersall.

Genus *Boreomysis*, G. O. Sars.

Boreomysis distinguenda, Hansen.

B. scyphops, G. O. Sars, 1885*a*.
B. distinguenda, Hansen, 1908*a*.
nec. B. scyphops, G. O. Sars, 1885*b*.

Scotia.

Station 301, lat. 64° 48′ S., long. 44° 26′ W., Weddell Sea, 2485 fathoms, trawl.—One female, 30 mm.

HANSEN, in describing the Crustacea collected by the *Ingolf* Expedition in northern seas, took the opportunity afforded by the capture of large numbers of the true *B. scyphops* to separate the present southern species from its northern ally, with which it had been confused by SARS. The distinguishing characters are to be found in the shape of the eye and of the antennal scale. No full description of *B. distinguenda* has yet appeared, but it is not possible to draw one up from the present specimen, which, besides being only about half-grown, is in a very poor state of preservation. Suffice it to say that, in respect of the eyes and antennal scale, its characters are in agreement with those given by HANSEN for distinguishing *B. distinguenda* from *B. scyphops.* Until HANSEN separated the two species, the latter was the last surviving instance of a bipolar Schizopod. Now there is no species common to the Arctic and Antarctic Oceans, though several genera are recognised as occurring at both Poles.

Boreomysis Brucei, sp. nov. (Plate, figs. 11–13.)

Scotia.

Station 414, lat. 71° 50′ S., long. 23° 30′ W., Weddell Sea, 2102 fathoms, vertical net, 0–1000 fathoms.—One immature male, 25 mm.

Station 416, lat. 71° 22′ S., long. 18° 15′ W., Weddell Sea, 2370 fathoms, trawl.—One immature male, 28 mm.

Specific Characters.—The frontal or rostral plate (Plate, fig. 11) is produced almost to the anterior level of the eyes. The lateral margins are slightly convex, and meet in an angle of less than a right angle, while the apex is produced into a short acute spine. The eyes are moderately large, broader than deep, with the pigment very pale brown. The eye-stalks have the distal tubercle well developed.

The antennular peduncle exhibits a light oblique ridge on the dorsal surface of the basal joint, and has the second joint narrow, but much deeper dorso-ventrally than either the first or third joints, so that it is almost circular in section.

The antennal peduncle extends anteriorly about half way up the distal joint of the antennular peduncle.

The antennal scale (Plate, fig. 12) overreaches the antennular peduncle considerably, and is three times as long as broad, the broadest portion before the middle. The outer margin is almost straight and ends in a prominent spine, beyond which the apex of the scale is slightly produced.

The telson (Plate, fig. 13) is three times as long as broad at its base, and has the terminal cleft one-quarter of the entire length. The lateral margins are armed with about thirty-six small spines, the first of which occurs about one-third of the way down the margin. The spines are proximally arranged in small series of two and three, but distally the last ten or a dozen spines are of equal length and not arranged in series of shorter and longer spines. The lateral lobes of the apex of the telson are armed with three strong spines, the outermost one of which is the longest.

The inner uropods (Plate, fig. 13) are about one-sixth as long again as the telson, without spines in the region of the otocyst. The outer uropods (Plate, fig. 13) are longer than the inner. The proximal portion of the outer margin, without spines or setæ, is about two-ninths of the length of the entire margin, and has two spines at its distal corner.

This species comes remarkably near to *B. sibogæ*, Hansen (1910), but differs in the more produced rostrum and in the shape of the antennal scale.

In *B. sibogæ* the rostral plate does not extend nearly as far forward as the anterior level of the eyes, and its margins meet in an obtuse angle. In *B. Brucei* the rostrum extends almost as far forward as the anterior level of the eyes, and its margins meet in an acute angle.

In *B. sibogæ* the spine on the outer margin of the antennal scale overreaches the apex of the scale. In *B. Brucei* the reverse obtains. *B. sibogæ* is a deep-water tropical species, *B. Brucei* a definitely Antarctic form.

B. Brucei also comes very near to *B. rostrata*, Illig (1906); but, so far as the latter has been described, it differs from *B. Brucei* in the different form of the antennal scale and the different armature of the telson.

I dedicate this new form to the leader of the Scottish National Antarctic Expedition, whose intrepid researches have brought it to light.

Sub-family SIRIELLINÆ, Norman.

Genus *Siriella*, Dana.

Siriella Thompsonii, H. Milne-Edw.

Scotia.

Station 11, lat. 23° 50′ N., long. 21° 34′ W., tow-net.—One.
Station 12, lat. 22° 19′ N., long. 22° 07′ W., tow-net.—Five.
Station 13, lat. 21° 58′ N., long. 22° 26′ W., tow-net.—One.

Station 14, lat. 21° 28′ N., long. 22° 40′ W., tow-net.—Ten.
Station 15, lat. 20° 34′ N., long. 23° 12′ W., tow-net.—Two.
Station 18, lat. 19° 59′ N., long. 23° 34′ W., tow-net.—One.
Station 21, lat. 18° 28′ N., long. 24° 28′ W., tow-net.—Seven.
Station 32, lat. 10° 46′ N., long. 25° 21′ W., tow-net.—One.
Station 33, lat. 9° 40′ N., long. 25° 28′ W., tow-net.—One.
Station 36, lat. 8° 42′ N., long. 25° 28′ W., tow-net.—Twenty-five.
Station 37, lat. 7° 50′ N., long. 25° 31′ W., tow-net.—Three.
Station 39, lat. 6° 43′ N., long. 25° 48′ W., tow-net.—Two.
Station 46, lat. 3° 13′ N., long. 26° 30′ W., tow-net.—Five.
Station 56, lat. 0° 42′ S., long. 31° 20′ W., tow-net.—Thirty-eight.
Station 58, lat. 2° 13′ S., long. 32° 23′ W., tow-net.—Forty-eight.
Station 59, lat. 2° 30′ S., long. 32° 42′ W., tow-net.—Eight.
Station 61, lat. 3° 38′ S., long. 33° 20′ W., tow-net.—One.
Station 62, lat. 4° 15′ S., long. 33° 38′ W., tow-net.—Eighteen.
Station 515, lat. 2° 32′ N., long. 19° 32′ W., tow-net.—Nine.

Discovery.

Funchal Bay, Madeira.—Four.
Lat. 13° 59′ S., long. 34° 35′ W.—Two.
Lat. 17° 15′ S., long. 32° 05′ W.—Three.
Lat. 30° 43′ S., long. 21° 36′ W.—One.
Lat. 33° 53′ S., long. 17° 38½′ W.—Two.

All the stations listed above are in the Atlantic Ocean, and all the specimens were captured at the surface. These records indicate that *S. Thompsonii* is an abundant species in the tropical Atlantic; and a correspondingly long list of captures given by HANSEN (1912) shows that it is likewise equally common in the Eastern Pacific. Its distribution is, in short, circumtropical, bounded, roughly speaking, by the lines of latitude 40° N. and 40° S. Several specimens in the *Scotia* collections were found to have the Epicarid, *Dajus siriellæ*, G. O. Sars, in their marsupial pouches. This parasite, first found by SARS in the same host, collected by the *Challenger*, has only been recorded once since its discovery, namely, by HANSEN (1912), who also found it in the present host.

Siriella denticulata, G. M. Thomson.

S. denticulata, Thomson, 1900.

Discovery.

Laurie Harbour, Auckland Isles.—One female, 6 mm., immature.

I refer this small and immature specimen to *S. denticulata*, Thomson, with some little doubt, and add a few notes supplementing THOMSON's description. The rostrum, in my specimen, can hardly be described as spiniform. The two lateral margins meet in almost a right angle with the apex hardly produced. There is, however, a promi-

nent pseudo-rostrum, as in *Macromysis inermis*, and it is possible that THOMSON may have mistaken this structure for the true rostrum. On the other hand, the rostrum may become more produced and spiniform with age, as it is known to do in certain Euphausians, *e.g. Thysanoëssa macrura*. The telson of the present specimen has three lateral spines on each margin, anterior to the constriction characteristic of the telson in this genus, and between the three small spines at the apex of the telson there are finer and longer setæ. THOMSON does not mention or figure either of these features. The inner uropods have seventeen spines on their inner margins, the spines commencing at the statocyst and extending the whole way to the distal extremity of the appendage, increasing in size. They are not arranged in series. There are five spines on the outer margin of the proximal joint of the outer uropods.

Sub-family MYSINÆ.

Genus *Antarctomysis*, Coutière.

Antarctomysis, Coutière, 1906.
Antarctomysis, Hansen, 1908*b*.
Antarctomysis, Tattersall, 1908.

Antarctomysis maxima, Hansen.

Mysis maxima, Holt and Tattersall, 1906.
Antarctomysis maxima, Coutière, 1906.
A. maxima, Hansen, 1908*b*.
A. maxima, Tattersall, 1908.

Scotia.

Station 325, lat. 60° 43′ 42″ S., long. 44° 38′ 33″ W., Scotia Bay, South Orkneys. —One immature female, 30 mm.

This species has a circumpolar distribution, having been captured by the *Discovery*, the *Belgica*, the Charcot Expedition, and now by the *Scotia*, at the four points of the compass in the Antarctic Ocean.

Order EUPHAUSIACEA.

Genus *Thysanopoda*, Milne-Edw.

Thysanopoda cornuta, Illig.

T. cornuta, Illig, 1905.
T. insignis, Hansen, 1905*b*.
T. cornuta, Hansen, 1912.

Scotia.

Station 467, lat. 40° 08′ S., long. 1° 50′ E., 2645 fathoms, trawl.—One female, 79 mm.

This magnificent specimen agrees well with both ILLIG's and HANSEN's descriptions. It was captured at very nearly the same place as the type-specimen, in the Benguela

Current, but rather further south. It is only known from five other specimens, three recorded by HANSEN from the North Atlantic, one by HANSEN from the East Pacific, and the type, captured by the *Valdivia* in the South Atlantic. It is one of the largest known Euphausians.

Thysanopoda tricuspidata, Milne-Edw.

Scotia.

Station 29, lat. 12° 31′ N., long. 25° 9′ W., tow-net.—Two.
Station 42, lat. 5° 25′ N., long. 26° 7′ W., tow-net.—One, larval.

Discovery.

Lat. 12° 27′ S., long. 33° 33′ W., tow-net.—One.
Lat. 13° 59′ S., long. 34° 35′ W., tow-net.—One large female, 22 mm.; three larvæ, 5–8 mm.
Lat. 17° 15′ S., long. 32° 05′ W., tow-net.—Five.

All these specimens were caught at the surface, and, with the exception of the large female, 22 mm., captured by the *Discovery*, are all larval or post-larval in development.

Genus *Euphausia*, Dana.

Euphausia Krohnii (Brandt).

Discovery.

Off Madeira, tow-net.—Fifteen.

This species seems at last to have found a name which may be considered more or less a permanent one. It has been known during the last ten years successively as *Euphausia pellucida*, *bidentata*, and *Mülleri*; but HANSEN (1910) has definitely established that *Thysanopoda Krohnii*, Brandt, an earlier name than any of the above, was applied to specimens identical with those of the later species. By this name, therefore, the species must henceforth be known.

Euphausia americana, Hansen.

E. americana, Hansen, 1911.

Scotia.

Station 14, lat. 21° 28′ N., long. 22° 40′ W., tow-net.—Five.
Station 18, lat. 19° 59′ N., long. 23° 34′ W., tow-net.—Four.
Station 26, lat. 14° 33′ N., long. 25° 9′ W., tow-net.—Two.
Station 29, lat. 12° 31′ N., long. 25° 9′ W., tow-net.—Thirteen.

Station 36, lat. 8° 42′ N., long. 25° 28′ W., tow-net.—One.
Station 39, lat. 6° 43′ N., long. 25° 48′ W., tow-net.—One hundred and thirty-six.
Station 42, lat. 5° 25′ N., long. 26° 7′ W., tow-net.—Ten.
Station 59, lat. 2° 30′ S., long. 32° 42′ W., tow-net.—One.
Station 512, lat. 0° 22′ N., long. 18° 43′ W., tow-net.—Four.

Discovery.

Lat. 7° 23′ S., long. 30° 23′ W.—Two.

Euphausia americana has only lately been instituted by Hansen, and appears to have been confused hitherto with *E. Krohnii*, to which it bears a considerable resemblance. It seems clear that some of the *Challenger* specimens referred to *E. pellucida* by Sars in reality belong to the present species. Hansen gives as the locality for this species, West Atlantic, Cape Verde; but the above list of captures shows that the species has a very general distribution in the tropical parts of the Atlantic Ocean.

Euphausia recurva, Hansen.

E. recurva, Hansen, 1905c.
E. recurva, Hansen, 1912.

Discovery.

Lat. 30° 43′ S., long. 21° 36′ W.—Thirty-one.
Lat. 33° 53′ S., long. 17° 38½′ W.—Five.
Lat. 35° 10′ S., long. 13° 40′ W.—Sixty-three.
Lat. 36° 27½′ S., long. 8° 20′ W.—One.
Lat. 37° 33¾′ S., long. 6° 09′ E.—Four.
Lat. 37° 12′ S., long. 9° 30′ E.—Three.

All the specimens were taken in surface tow-nettings. The majority are post-larval in development, but appear to belong to this species.

E. recurva is known from the South Atlantic, Indian Ocean, and from two or three localities in the Pacific (Hansen, 1912).

Euphausia brevis, Hansen.

E. brevis, Hansen, 1905c.
E. brevis, Hansen, 1912.

Discovery.

Lat. 12° 27′ S., long. 33° 33′ W.—One.
Lat. 13° 59′ S., long. 34° 35′ W.—One.
Lat. 17° 15′ S., long. 32° 05′ W.—Seven.
Lat. 36° 27½′ S., long. 8° 20′ W.—One.

Scotia.

Station 14, lat. 21° 28′ N., long. 22° 40′ W., tow-net.—Twenty-three.

E. brevis has a general distribution in the tropical parts of the Atlantic Ocean, in the Indian Ocean, and in the Eastern Pacific. It has also been recorded from the Mediterranean (TATTERSALL and HANSEN). HANSEN notes that most of the specimens recorded have been taken at the surface. The present records are no exception.

Euphausia tenera, Hansen.

E. tenera, Hansen, 1905*c*.
E. tenera, Hansen, 1910.
E. tenera, Hansen, 1911.

Scotia.

Station 14, lat. 21° 28′ N., long. 22° 40′ W., tow-net.—Three.
Station 18, lat. 19° 59′ N., long. 23° 34′ W., tow-net.—Two.
Station 29, lat. 12° 31′ N., long. 25° 9′ W., tow-net.—Twenty-two.
Station 36, lat. 8° 42′ N., long. 25° 28′ W., tow-net.—Fifty.
Station 39, lat. 6° 43′ N., long. 25° 48′ W., tow-net.—Twelve.

Discovery.

Lat. 7° 23′ S., long. 30° 23′ W.—Five.
Lat. 13° 59′ S., long. 34° 35′ W.—Three.

All the specimens here recorded were captured at the surface.

Euphausia superba, Dana.

E. superba, Tattersall, 1908.

Scotia.

Station 152, lat. 60° 32′ S., long. 43° 40′ W., February 2nd, 1903, stomach of *Lobodon carcinophaga*.—Many.

Station 156, off Saddle Island, South Orkneys, February 3rd, 1903, edge of the ice-floes.—Twenty.

Station 159, lat. 61° 20′ S., long. 43° 23′ W., February 4th, 1903, stomach of penguin.—Many.

Station 203, lat. 59° 38′ S., long. 29° 55′ W., February 13th, 1903, edge of ice-floes, tow-net.—Seven.

Station 325, lat. 60° 43′ 42″ S., long. 44° 38′ 33″ W., Scotia Bay, South Orkneys, April to July 1903.—Fifty-one in nets, and many from the stomachs of fish.

Station 411, lat. 74° 01′ S., long. 22° 00′ W., off Coats Land, 161 fathoms, traps.—Eighteen.

Station 414, lat. 71° 50′ S., long. 23° 30′ W., vertical net, 0–1000 fathoms.—Five.

Station 417, lat. 71° 22′ S., long. 16° 34′ W., 1410 fathoms, trawl.—One large female.

Station 418, lat. 71° 32′ S., long. 17° 15′ W., 1221 fathoms, trawl (not on bottom).—One male.

Station 422, lat. 68° 32′ S., long. 12° 49′ W., vertical net, 0–800 fathoms.—Three.

Dr Bruce has furnished me with three coloured sketches of Euphausians, all of which refer to this species. One of the sketches, of a specimen caught in February 1903 at the edge of the ice-floes, agrees almost perfectly with the account of the colour of this species as noted by Dr G. Racovitza during the expedition of the *Belgica*, and published by Hansen (1908*b*). In the other two sketches, of specimens captured in February 1903 and March 1904, there is considerably more red pigment shown on the dorsal surface of the carapace and abdomen. The distribution of the pigments is the same in all three sketches, but in the two latter ones the red is intensified. This difference, it seems probable to me, may be accounted for by the supposition that, in the animal from which the first sketch mentioned above was made, the red chromatophores were in a contracted condition, and in the other two specimens they were in an expanded condition at the time they were painted.

Euphausia superba is the Euphausian *par excellence* of the Antarctic Ocean. It is circumpolar in its distribution, and has been recorded by all the recent expeditions which have visited those waters. It likewise forms the major part of the food of the crab-eating seal, *Lobodon carcinophaga*, and of certain of the penguins.

Euphausia lucens, Hansen.

E. lucens, Hansen, 1905*c*.
E. lucens, Hansen, 1911.

Discovery.

Lat. 36° 27½′ S., long. 8° 20′ W.—Two.

Lat. 37° 47′ S., long. 3° 59′ E.—Two.

Lat. 37° 33¾′ S., long. 6° 09′ E.—Fifteen.

This species of the genus is one of the rarest, and has not been captured by any of the expeditions since the *Challenger*. Hansen mentions specimens from three localities in the South-East Atlantic, very much in the same neighbourhood as the present records, and from one locality between Tasmania and New Zealand.

Euphausia hemigibba, Hansen.

E. hemigibba, Hansen, 1910.

Scotia.

Station 14, lat. 21° 28′ N., long. 22° 40′ W., tow-net.—Thirteen.

Station 18, lat. 19° 59′ N., long. 23° 34′ W., tow-net.—One.

Station 21, lat. 18° 28′ N., long. 24° 28′ W., tow-net.—Two.

Discovery.

Lat. 30° 43′ S., long. 21° 36′ W.—Six.
Lat. 35° 10′ S., long. 13° 40′ W.—Three.
Lat. 36° 27½′ S., long. 8° 20′ W.—One.

At present, this species is known only from the tropical Atlantic (HANSEN), Indian Ocean, and Mediterranean (TATTERSALL).

Euphausia pseudogibba, Ortmann.

E. pseudogibba, Ortmann, 1893.
E. pseudogibba, Hansen, 1910.
E. pseudogibba, Hansen, 1912.

Scotia.

Station 29, lat. 12° 31′ N., long. 25° 9′ W., tow-net.—One.

This species is known from the tropical Atlantic, Indian Ocean, and the Pacific, from which the types were recorded. It is most generally distributed in the Indian Ocean and the Atlantic, and decidedly rarer in the Pacific.

Euphausia gibboides, Ortmann.

E. gibboides, Ortmann, 1893.
E. gibboides, Hansen, 1911.
E. gibboides, Hansen, 1912.

Discovery.

Lat. 36° 27½′ S., long. 8° 20′ W.—One female, 22 mm.

This specimen differs from the description and figures given by HANSEN (1912) in the form of the lobe on the first joint of the antennular peduncle. This lobe has a bifid extremity, the outer process quite minute, and much smaller than the inner and main extremity. The specimen, however, agrees otherwise so well with *E. gibboides* that it has seemed best to include it in that species for the present, at any rate until male specimens are forthcoming and the copulatory organs on their pleopods can be investigated.

Euphausia longirostris, Hansen.

E. longirostris, Hansen, 1908*b*.
E. longirostris, Hansen, 1911.

Discovery.

Lat. 37° 47′ S., long. 3° 59′ E.—One adult male, 19 mm.

When first I examined this specimen, I determined it as a variety of *E. spinifera*, G. O. Sars, with which it agrees very closely, except in regard to the lobe from the

first joint of the antennular peduncle. This lobe in *E. spinifera* extends right across the peduncle and has its anterior margin irregularly digitate. In the present specimen, the lobe does not stretch right across the peduncle, and the extremity is bifid. It thus agrees, in this respect, with *E. longirostris*. The copulatory organs on the first pleopods, however, agree almost exactly with those figured by Sars for *E. spinifera*. Hansen has not, up till now, described the male of *E. longirostris*, so I am unable to compare my specimen from this point of view.* Hansen says that *E. longirostris* is closely related to *E. spinifera*, and is only distinguished by the antennular lobe. On that character, therefore, I refer my specimen to that species.

E. longirostris is known, at present, only from the Antarctic Ocean to the south of the Falkland Islands and in the neighbourhood of South Georgia. The present record, therefore, is the most northerly one yet known for the species.

Genus *Thysanoëssa*, Brandt.

Thysanoëssa macrura, G. O. Sars.

T. macrura, G. O. Sars, 1885*a*.

Scotia.

Station 319, lat. 61° 05′ S., long. 43° 20′ W., 214 fathoms.—One female, 14 mm.

Station 414, lat. 71° 50′ S., long. 23° 30′ W., vertical net, 0–1000 fathoms. —One female, 28 mm.

If the evidence of the antennular flagellum be accepted, the smaller of these two specimens is correctly referred to this species, since it is distinctly shorter than the two distal joints of the peduncle. The larger specimen seems clearly to belong to *T. macrura*. The species has a circumpolar distribution in Antarctic waters.

Thysanoëssa gregaria, G. O. Sars.

T. gregaria, G. O. Sars, 1885*a*.

Scotia.

Station 98, lat. 34° 02′ S., long. 49° 07′ W., tow-net.—One.

Station 458, lat. 42° 57′ S., long. 8° 13′ W., tow-net.—Twenty-six.

Discovery.

Lat. 37° 47′ S., long. 3° 59′ E.—Two.

A post-larval specimen of the genus *Thysanoëssa* taken by the *Scotia* at Station 137, lat. 57° 42′ S., long. 46° 33′ W., cannot be referred to its adult species. It may belong to *T. gregaria* or to *T. vicina*, Hansen (1911).

* See note, p. 204. In this paper Hansen describes and figures the copulatory organs of the male of this species, and points out minor differences from those of *E. spinifera*.

Genus *Nematoscelis*, G. O. Sars.

Nematoscelis microps, G. O. Sars.

N. microps, G. O. Sars, 1885*a*.
N. microps, Hansen, 1905*b* and *c*.
N. microps, Hansen, 1910.
N. microps, Hansen, 1912.

Scotia.

Station 12, lat. 22° 19′ N., long. 22° 07′ W., tow-net.—Ten.
Station 14, lat. 21° 28′ N., long. 22° 40′ W., tow-net.—Thirteen.

These specimens are all small and in rather poor condition. I cannot be quite certain of their identity, but I believe they ought to be referred to this species.

Genus *Stylocheiron*, G. O. Sars.

Stylocheiron carinatum, G. O. Sars.

S. carinatum, G. O. Sars, 1885*a*.
S. carinatum, Hansen, 1910.
S. carinatum, Hansen, 1912.

Discovery.

Lat. 13° 59′ S., long. 34° 35′ W.—One.
Lat. 17° 15′ S., long. 32° 05′ W.—Thirteen.

This interesting and easily recognisable species of the genus *Stylocheiron* is widely distributed in the various tropical waters of the globe.

Order STOMATOPODA.

Family Squillidæ.

Genus *Squilla*, Fabricius.

Squilla armata, Milne-Edwards.

Scotia.

Station 481, N.W. off Ijzer Fontein Point, Cape Colony, 35 fathoms, sand, trawl.—Two, 116 mm. and 98 mm.

Genus *Lysiosquilla*, Dana.

Stomatopod larvæ, referable to this genus, were taken on two occasions, in surface tow-nets.

Station 64, lat. 6° 30′ S., long. 34° 25′ W., off Brazil, tow-net.—One, 3 mm.
Station 66, lat. 7° 9′ S., long. 34° 30′ W., off Brazil, tow-net.—Two, 2 mm. and 3·5 mm.

These specimens, belonging to the genus of larval Stomatopods known as *Lysierichthus*, cannot be referred to their adult species.

Order ISOPODA.

Tribe *FLABELLIFERA*.

Family Eurydicidæ.

Genus *Cirolana*, Leach.

Cirolana, Hansen, 1890.

Cirolana hirtipes, Milne-Edwards.

C. hirtipes, Hansen, 1890.

Scotia.

Station 482, Saldanha Bay, Cape Colony, May 1904, 8–10 fathoms, trawl.—One, 25 mm.

This species is only certainly known from the Cape, from which Milne-Edwards' type was procured, and from which Hansen has since recorded a single specimen.

Cirolana sulcata, Hansen.

C. sulcata, Hansen, 1890.

Scotia.

Station 482, Saldanha Bay, Cape Colony, May 1904, 8–10 fathoms, trawl.—One.

Recorded from the shores of Simon's Bay by Hansen (1890), and from Somerset West, False Bay, by Stebbing (1902). Not known from any other locality.

Family Corallanidæ.

Genus *Lanocira*, Hansen.

Lanocira sp. ?

Scotia.

Station 482, Saldanha Bay, Cape Colony, May 1904, 8–10 fathoms.—One, 12 mm.

The telson of this specimen is, unfortunately, damaged, so that it is not possible to identify the species, if known, or to describe the specimen satisfactorily. Moreover, the sex of the specimen is uncertain. The absence of oostegites and of the external setiferous lobe to the maxillipedes indicates that the specimen is a male. On the other hand, I can find no *appendix interna* on the second pleopods.

The structure of the mouth parts clearly indicates the generic position of this specimen, and, in the form of these appendages, it approaches very closely, among the described species, to *L. zeylanicus*, Stebbing (1905*a*), with which it agrees in the strong

development of the hook of the first maxilla and in the great inequality in the length of the two setæ arming the distal joint of the second maxilla.

The shape of the body has been considerably altered, presumably by the method of preservation. The segments are more or less separated from each other, and the whole body considerably distended, so that it is impossible to get a fair idea of the normal form. As it is, the specimen has not the compact, broadly oval, rotund form of the other members of the genus. The body is nearly three times as long as broad, and the epimeral plates seem to be more in evidence in dorsal view than in the figures of other species of the genus. The length, moreover, is almost twice that of any other species. The largest described form is *L. Gardineri*, Stebbing (1904), which is 7 mm. long, while females of *L. rotundicauda*, with young in the brood-pouch, measure only 5·25 mm. The present specimen is 12 mm. long.

The body is provided with setæ only on the fourth and fifth segments of the mesosome and the whole of the telson. In this respect it is more setose than *L. Gardineri* and *L. rotundicauda*, but less so than in *L. zeylanicus*.

The broadly oval inner branch of the uropods bears seven spines at its extremity, and the outer branch, which is just slightly shorter than the inner, bears three spines.

I prefer to leave the identity of this species an open question till more specimens, not deformed or mutilated in any way, are available. In the meantime, the genus has not, so far as I am aware, been recorded from South Africa previously.

Family Cymothoidæ.

Genus *Glossobius*, Schiödte and Meinert.

Glossobius linearis (Dana).

G. linearis, Hansen, 1895.

Scotia.

Station 36, lat. 8° 42′ N., long. 25° 28′ W., tow-net.—One young, in the second stage, 3 mm.

This specimen agrees very closely with the specimens described and figured by Hansen (1895). I would point out, however, that both Hansen's specimen and my own show four well-developed teeth on the dactylus of the first thoracic legs. Schiodte and Meinert (1879–84) show only three well-developed teeth and a rudimentary one for *G. linearis*, but four well-developed teeth for *G. laticauda*. In this character, therefore, and in the shape of the eyes the present specimen approaches more closely to *G. laticauda* (M.-Ed.), a Pacific species. On the other hand, this specimen agrees so well with Hansen's specimens, and is so obviously the same species, that I accept his decision as to the name it should bear.

Family Sphæromidæ.

Genus *Limnoria*, Leach.

Limnoria lignorum (Rathke).

Scotia.

Station 118, 51° 41′ S., 57° 51′ W., Port Stanley, Falkland Islands, January 1903.—One.

This specimen was found among other Isopoda from Port Stanley, with no special note as to how it was come by. I cannot say, therefore, if it was engaged in its usual practice of destroying wooden structures. I can find no appreciable differences from northern specimens of the same species. The nearest recorded place of capture is Port Elizabeth, South Africa (Stebbing, 1908).

Genus *Exosphæroma*, Stebbing, 1900*a*.

Exosphæroma, Hansen, 1905*a*.

Exosphæroma gigas, Leach.

E. gigas, Stebbing, 1900*a*.

Scotia.

Station 118, 51° 41′ S., 57° 51′ W., Port Stanley, Falkland Isles, January 1903.—*ca.* fifty, all sizes.

Station 349, 51° 41′ S., 57° 51′ W., Port William, Falkland Isles, January 1904.—Nineteen.

I have nothing to add to Stebbing's detailed account of this species. It was infested, as seems usual with the species in this part of the world, with *Iais pubescens.*

Exosphæroma tristense (Leach). (Plate, fig. 1.)

Sphæroma tristense, Leach, 1818.
Sphæroma tristense, Hansen, 1905*a*.
nec. Sphæroma tristense, Krauss, 1843.
nec. Sphæroma tristense, Stebbing, 1910.

Scotia.

Station 461, lat. 40° 20′ S., long. 9° 56′ 30″ W., Gough Island, 21st–22nd April 1904.—One male, 10 mm., and three females, 5–6 mm., from the shore and from floating weed.

I refer these specimens from Gough Island to Leach's rather obscure species, which does not seem to have been recognised since it was described in 1818, from

specimens taken at Tristan d'Acunha. The female specimens agree with LEACH's brief description in its main points—body smooth, terminal segment of the abdomen terminating in an obtuse point and having at its base two elongated and rather indistinct tubercles. The description of the terminal segment of the abdomen and the uropods may be amplified somewhat. The last segment of the abdomen is triangular in shape, narrowing to a rather produced apex, the actual tip of which is bluntly rounded. The segment is not evenly vaulted from its edges, as, for instance, it is in *E. gigas*; but some little way in from the margins there is a shallow impressed groove running more or less parallel with the margins all the way round. The central portion thus marked off is evenly vaulted, and bears anteriorly two elongated but only slightly pronounced tubercles. The inner and outer uropods are about equal in length, and barely reach the apex of the abdomen. The inner one is truncate at its distal extremity, the outer one evenly rounded.

The male specimen, 10 mm. in length, which I refer to this species, differs from the female in having the seventh segment of the thorax produced into a short, blunt median process, which projects slightly beyond the anterior margin of the last segment of the pleon (Plate, fig. 1). Moreover, the tubercles on the latter are very obscure and almost obsolete. But otherwise the agreement with the female specimens is very close, especially in the form of the pleon and uropods, as described above, though the latter are, perhaps, a little more fully developed. I have very little doubt that the male specimen should be referred to the same species as the females, and I think I am correct in regarding both as examples of LEACH's species.

If my identification is correct, the generic position of the species requires consideration. As regards the mouth organs and the structure of the pleopods, the specimens are in complete harmony with the genus *Exosphæroma*. Moreover, they show the closest agreement with the type of that genus, *E. gigas*, Leach, in the general form and the structure of the various appendages. They differ from *E. gigas* in the form of the pleon and uropods in both sexes, and in the process from the seventh thoracic segment in the male. HANSEN's amended definition (1905*a*) of the genus *Exosphæroma*, however, runs as follows:—"Last thoracic segment unarmed in both sexes. End of the abdomen at most somewhat produced, but not acute." If this definition be accepted, LEACH's species would be excluded from the genus *Exosphæroma* by the characters of the last thoracic segment of the male, and would fall into one or other of the genera *Zuzara* and *Isocladus*. These latter genera are, however, further characterised by the great development of the uropods in the male, greater in *Zuzara* than in *Isocladus*, but much greater in both than in the present species, in which the difference between the sexes in this respect is almost negligible. The females of all three genera are very much alike, and HANSEN himself has indicated the great difficulty of separating the genera in a satisfactory manner. Moreover, as STEBBING (1910) points out, he has at least implied a modification of the definition of *Exosphæroma*, quoted above, by including in the genus *Sphæroma*

Stimpsonii, Heller (1868). HELLER says of the latter that the hind margin of the seventh segment of the thorax is produced into a conical process, and that the telsonic segment has an acute apex. The adjective "acute," as applied to the telson, is, I take it, meant relatively to the shape of that organ in such a species as *E. gigas*, and in no way intended absolutely. I have accepted this implied emendation to the characters of the genus *Exosphæroma*, and, as modified, include *S. tristense*, Leach, within its limits.

I may, perhaps, be allowed to suggest the probability that *E. tristense*, Leach, and *E. Stimpsonii*, Heller, are synonymous. I have already referred to the close similarity between *E. tristense* and *E. gigas* as regards their appendages and general structure. The above remarks on *E. Stimpsoni* apply equally well to the male of the specimen I refer to *E. tristense*, and I think it highly probable the two forms are one and the same species. I have not the necessary material to pronounce a definite opinion here, but I make the suggestion, for any future worker with more material at his disposal to decide. If the suggestion is upheld by future research, LEACH's name has priority. The females of *E. tristense* agree very closely with WHITE's types of *S. leucura*, which I have examined at the British Museum. This species was named by WHITE (1847), but never described. It is not unlikely that it will be found to be synonymous with *S. integrum*, Heller, described from specimens taken off Chile, near the same locality as that from which WHITE's types came. HELLER's name would have preference, since WHITE's name can only be regarded as a *nomen nudum*. HANSEN refers *S. leucura* to *Exosphæroma*, and *S. integrum* to, possibly, *Isocladus* or *Zuzara*. I believe both should be referred to the genus *Exosphæroma*, and suspect that the males will be found to have the same form as those of *E. tristense*. It would not surprise me if *Sphæroma Stimpsonii*, *S. leucura*, and *S. integrum* were all eventually found to be synonymous with *S. tristense*, though females of allied species of *Exosphæroma* are notoriously difficult to separate.

Exosphæroma Kraussii, sp. nov. (Plate, figs. 2 and 6.)

? *Sphæroma tristense*, Krauss, 1843.
? *Sphæroma tristense*, Stebbing, 1910.

Scotia.

Station 483, entrance to Saldanha Bay, Cape Colony, trawl.—Three females, 8 mm.

Specific Characters.—Sexes similar; body microscopically granular, especially on the pleon and uropods; segments of the thorax with four very obscure small tubercles equidistantly placed, the tubercles most pronounced on the last thoracic segment, and becoming almost obsolete on the anterior segments; a pair of larger and more definite rounded tubercles on the centre of the combined first three segments of the pleon; last segment of the latter triangular in shape with a pointed apex, having a pair of closely approximating, conspicuous elongate tubercles at the centre of the anterior part, the tubercles separated by a shallow groove, from the distal end of which a light carina runs

to the apex of the telson; epimera visible in dorsal view; uropods subequal in length, slightly shorter than the telson, inner ramus bluntly rounded, outer ramus acute, the extremity of both branches minutely and irregularly denticulate when seen under the low power ($\frac{2}{3}''$) of the microscope (Plate, fig. 6).

I believe this species to be the one recorded by KRAUSS (1843) as *Sphæroma tristense*, Leach. KRAUSS' description may be quoted in full: "Die 2 langlich Hockerchen auf dem letzten segmente, so wie die stumpfe Spitze des Abdomen bestimmen mich, meine Examplare für diese von LEACH nur sehr kurz beschriebene Art zu halten, jedenfalls gehoren sie zu der Abtheilung der Spezies, deren 2 letzte Ringe des Thorax wie die vorderen gebildet sind; aber alle Ringe haben in der Mitte 4 sehr undeutliche Hockerchen und an den Seiten eine ahnliche Anschwellung. Die Lamellen der hinteren falschen Füsse haben glatte Ränder und sind gerade so lang als die Spitz des Abdomen. In der Tafelbai. Länge 5·2 linien."

The adjective "stumpfe," it is true, does not accurately describe the apex of the pleon in the present form, but the character which I rely on mainly for the identification of this species with the one observed by KRAUSS is: "all the segments have in the middle four very obscure tubercles." This does not apply to *S. tristense* of LEACH, which has the thorax smooth; but it accords very well with the present species, though the tubercles are almost obsolete on the anterior segments. The "similar intumescence" on the sides of the segments, mentioned by KRAUSS, is present on the segments of *E. Kraussii*, as a slight swelling in the region of the junction of the body segments with their epimeral plates. If *E. Kraussii* is not identical with *S. tristense*, Krauss, I am unable to identify it with any described form.

In the British Museum I found several specimens of this species, unnamed, from Cape Town. Among them were two or three males, which agree in all respects with the females, and have no processes on the thoracic segments. In the characters of the mouth parts and pleopods, the species is in agreement with the genus *Exosphæroma*. I have named the species in honour of the only worker on South African Crustacea (previous to the recent researches of STEBBING), who most probably had the species before him in compiling his catalogue.

The species is, so far, only known from Cape Colony in the neighbourhood of Cape Town and neighbouring bays.

Exosphæroma Coatsii, sp. nov. (Plate, figs. 3 and 4.)

Scotia.

Station 118, lat. 51° 41′ S., 57° 51′ W., Port Stanley, Falkland Islands, January 1903.—Six females, 4–10 mm.

Specific Characters.—Body capable of rolling up, or at least doubling up; epimeral plates not visible in dorsal view, projecting down at right angles to the rest of the segments of the body, from which they are sharply marked off by a strong ridge which

projects laterally and hides the plates from the dorsal aspect; segments of the thorax with four small, equally distant tubercles on the dorsal surface, the tubercles more pronounced than in *E. Kraussii*; a pair of larger tubercles in the centre of the combined first three segments of the pleon; terminal segment of the latter triangular in shape with the apex somewhat produced but the actual tip rounded; centre of the telsonic segment evenly vaulted from a point some little way in from the margins, bearing in the centre two pairs of large tubercles, the anterior pair slightly narrower and more elongate than the posterior pair; behind the latter in the median line are two smaller tubercles, one behind the other; the lateral parts of the telsonic segment with a number of minute tubercles or granulations; a very light carina runs from the base of the median tubercles to the apex of the telson; inner and outer uropods shorter than the telson; apex of the inner one truncate, with the outer corner somewhat produced into a sharp angle; outer uropod almost sabre-shaped, apex sharpely acute.

My report was almost completed when I received the large adult female specimen, on which this description is based, from the Rev. T. R. R. STEBBING, who found it and another example among some Decapod crustaceans from the same place. I had already figured as the type the largest specimen then in the collection, a female, 6 mm., and I reproduce that figure here because it illustrates the differences between the young and adult of this species, and as a contribution to our knowledge of the changes which a Sphæromid may undergo during growth. A comparison of the two figures will show that there is considerable difference between the young and adult stages. In the young stage, the telsonic segment is less produced and its apex more obtuse than in adult specimens. It bears only the two pairs of larger tubercles of the adult stage, the two median tubercles and the lateral minute tubercles being absent. The tubercles throughout the body are less developed in the young stage. The differences in the uropods are quite considerable. In the young example both uropods have more or less evenly rounded extremities, quite distinct from the form of the uropods in the adult as described above.

Having seen no male specimens, I am unable to say whether this species exhibits any marked sexual differences. Otherwise the species seems clearly referable to the genus *Exosphæroma*, as far as the characters of the mouth organs and pleopods go.

The arrangement of the epimeral plates is quite characteristic. The first plate projects forward under the eyes, the next four are rectangular or rhomboidal in shape, while the sixth is larger than any of the others and projects backwards so as to almost hide the small seventh plate. When the animal is doubled in two, the epimeral plates form a very good protection for the sides of the body.

The arrangement of the tubercles will allow the species to be recognised at once. It differs from *E. Kraussii* in the more pronounced nature of the tubercles of the body, in the possession of two pairs of large tubercles in the telsonic segment, and the shape of the uropods, as well as in the form of the epimeral plates.

I have seen a specimen of this species, unnamed, in the British Museum, from the island of St Paul.

Genus *Cymodoce*, Leach.

Cymodoce uncinata, Stebbing.

C. uncinata, Stebbing, 1902.

Scotia.

Station 482, Saldanha Bay, Cape Colony, May 1904.—Two males, 6 mm. and 12 mm.; four females, 7–8 mm.

The females of this form do not seem to have been hitherto observed. They have two submedian, blunt and rounded bosses on the telsonic segment, which correspond to the large bosses found on the male, but are very much less developed. The bosses are not so well developed in the largest female as in the smaller male, in which they have reached almost adult proportions. The apex of the telsonic segment of the female is trifid, with the median lobe well developed and bluntly rounded, and the lateral lobes marked off by mere notches. The apex of the telson in the young male is of the same form. It seems to me that the form of the apex of the telson characteristic of the adult male is reached by the greater development of the lateral lobes of the female, and consequently of the notches which separate them from the median lobe.

The most characteristic feature of the present species is the scythe-like termination of the outer uropod, and the sharply truncate extremity of the inner uropod, which are the same for both sexes. Stebbing mentions both of these points, but hardly emphasises them.

Sphæromidæ of uncertain identity.

Two specimens of eubranchiate Sphæromidæ, representing two distinct species, are present in the collection. Both are female and, as such, cannot be referred to their correct genera, though they appear to be very closely allied to *Dynamenella*. I have not attempted to refer them to their proper species. They may briefly be noted as follows:—

(1) Station 118, 51° 41′ S., 57° 51′ W., Port Stanley, Falkland Isles.—One female, 4 mm. (Plate, figs. 7 and 8.)

The most characteristic feature of this specimen is the form of the telson, which I have represented on Plate, figs. 7 and 8. Looked at from above, it takes the form of a triangle narrowing rapidly to an abrupt apex; but from the ventral surface the lateral margins are seen to be folded in to a certain extent, though they do not meet in the mid-ventral line to form a definite tube as in *Cymodocella*, nor is the half tube thus formed as long as in the latter genus. Looked at from the posterior end, therefore, the end of the telson appears as a semicircular notch; but this cannot be considered as a notch in the apex of the telson, since it is formed by the infolding of

the lateral margins. The body presents no processes or tubercles of any kind, though the integument appears granular to a certain extent, due probably to extraneous matter and not a definite character of the integument itself. The mouth parts and pleopods agree with the characters of the sub-family *Sphærominæ eubranchiata*.

(2) Station 482, Saldanha Bay, Cape Colony, May 1904.—One female, 6 mm. (Plate, figs. 9 and 10.)

The body is quite smooth, without tubercles or processes of any kind whatever. The colour is a golden yellow minutely flecked with black pigment. The telson is similar in form to that of the last specimen, but less abruptly narrowed, with a wider apex, and less inwardly folded margins. The result is that, from the dorsal aspect, the apex of the telson appears slightly emarginate.

The telsonic segment and uropods are shown on Plate, fig. 9. The most characteristic feature of the specimen is the form of the superior antenna (Plate, fig. 10), in which the second joint of the peduncle is very broad, with a strong ridge throughout its whole length, so that in cross-section it would appear triangular and not lamellar. The third joint is quite small and distally expanded.

Further specimens of both these forms are desirable before their systematic position can be determined.

Tribe *VALVIFERA*.

Family Idoteidæ.

Genus *Paridotea*, Stebbing, 1900*b*.

Paridotea ungulata (Pallas).

P. ungulata, Stebbing, 1900*b*.

Scotia.

Station 478, Table Bay, Cape Town Harbour, May 1904.—Five.
Station 482, Saldanha Bay, Cape Colony, May 1904, 5–25 fathoms.—Abundant.

Specimens were also procured from the stomach of a dogfish, caught in Saldanha Bay.

Genus *Synidotea*, Harger.

Synidotea hirtipes (Milne-Edwards).

S. hirtipes, Stebbing, 1902.

Scotia.

Station 478, Table Bay, Cape Town Harbour, May 1904.—Four.
Station 482, Saldanha Bay, Cape Colony, May 1904, 5–25 fathoms.—Abundant.

Genus *Idotea*, Fabricius.

Idotea metallica, Bosc.

Scotia.

Fifteen specimens belonging to this species were found among the collections submitted to me, without any note as to the locality of their capture. I suspect they were taken among the Gulf weed, through which the *Scotia* passed between 22nd June and 30th June 1904.

Station 482, Saldanha Bay, Cape Colony, May 1904.—Two.

Family Astacillidæ.

Genus *Antarcturus*, zur Strassen.

Antarcturus ornatus, sp. nov. (Plate, fig. 5.)

Scotia.

Station 482, Saldanha Bay, Cape Colony, May 1904.—One female, 7 mm.

Plate, fig. 5, gives a general idea of the form of this species and shows its most characteristic feature, namely, its ornamentation or armature of short, stiff bristles on all the segments of the body.

The head and the first three segments of the thorax equal together the length of the large middle segment. The last three segments of the thorax are widely separated. The metasome has two segments partially marked off with transverse sutures.

The setæ are found on the dorsal surface of the animal, on all the segments, as well as on the head and metasome. The surface of the body is irregular, roughened, and microscopically spinulose, but there are not any distinct tubercles. The first three and the last three segments of the mesosome are elevated dorsally when seen in lateral view, and the setæ are arranged in a broad band across this elevated part, and are most numerous in the centre. The well-marked intervals between the last three segments of the mesosome are devoid of setæ. The middle segment of the body shows two setigerous areas, a wide and broad anterior one and a narrow posterior one, separated by a shallow depression devoid of setæ. This is shown very well in lateral view. Both the setigerous areas are elevated and roughened; the non-setigerous band, smooth and depressed.

The eyes are moderately well developed and lateral. The superior antenna reaches to the level of the distal end of the second joint of the peduncle of the inferior antenna. The flagellum is equal in length to the last two joints of its peduncle and bears olfactory filaments.

The inferior antenna is two-thirds of the entire length of the animal from the front of the head to the posterior end of the metasome. The fourth joint is equal in

length to the preceding three joints, and slightly longer than the fifth joint. The flagellum is short, about half as long as the fifth joint, composed of three joints, the last joint terminating in a spine. I cannot see any denticulations on the inner margin of the flagellum. The inferior antenna is armed with a few scattered stout setæ similar to those which are found on the body, but there are no teeth or spines of any kind.

The first gnathopods are broken off on both sides. The remaining legs present no special features.

Only one other South African Arcturid is known, *Antarcturus kladophorus*, Stebbing (1908). From this species *A. ornatus* is readily distinguished by the quite different character of the armature of the body, by the shorter and stouter inferior antenna, and by the shorter flagellum to the latter. I know of no species of this group with which *A. ornatus* can be confused. Spiny and tuberculous forms are common, but no setigerous species have been described.

The generic position of this form is doubtful. STEBBING (1908) gives a table for the discrimination of genera belonging to this family, based primarily on the number of marsupial plates. KOEHLER (1911) has shown that all the genera of Arcturidæ possess three oostegites, and that therefore this character is useless for generic separation. This discovery increases the difficulty of deciding the generic position of the species of the family. In the general form of the body, *A. ornatus* approaches *Antarcturus* and *Arcturella*, and I provisionally refer it to the former genus. It cannot be referred to *Arcturina*, Koehler, because the second and third thoracic limbs are not robust, but conform to the type met with in *Antarcturus*. Male specimens are necessary to decide whether it should be referred to the genus *Arcturopsis*, Koehler. The separation of the epimeral plates would seem to exclude it from the genus *Pleuroprion*, zur Strassen.

Tribe *ASELLOTA*.

Family JANIRIDÆ.

Genus *Iais*, Bovallius.

Iais pubescens (Dana).

I. pubescens, Stebbing, 1900*a*.

Scotia.

Station 118, lat. 51° 41′ S., long. 57° 51′ W.

A large number of specimens of this curious and interesting commensal Isopod were found in the bottles containing *Exosphæroma gigas* from Port Stanley and Port William, Falkland Isles. They were, presumably, living on the latter species when captured. I have nothing to add to STEBBING's description of the species.

Tribe *EPICARIDEA*.

Family Bopyridæ.

Genus *Probopyrus*, Giard and Bonnier.

Probopyrus latreuticola (Gissler).

Scotia.

Station 538, lat. 32° 11′ N., long. 34° 10′ W., tow-net.—Eight, from *Latreutes ensiferus*, captured among the Gulf weed.

Family Dajidæ.

Genus *Heterophryxus*, G. O. Sars.

Heterophryxus appendiculatus, G. O. Sars. (Plate, figs. 14 and 15.)

H. appendiculatus, G. O. Sars, 1885*a*.

Scotia.

Station 39, lat. 6° 43′ N., long. 25° 48′ W., tow-net.—One female, with attached male, free in a tow-netting containing many *Euphausia americana*, Hansen.

Station 512, lat. 0° 22′ N., long. 18° 43′ W., tow-net.—One female, with attached male, from *Euphausia americana*.

It is almost certain that the specimen from Station 39, found unattached, was originally parasitic on *Euphausia americana*, of which there were over one hundred specimens in the same gathering. Thus both specimens in this collection were from the same host.

These specimens differ from those described and figured by me (1905) from specimens taken from *Euphausia Krohnii* in the form of the last pair of legs. I figure on the Plate these limbs from one of the present specimens (fig. 14) and from a specimen taken in the North Atlantic to the west of Ireland (fig. 15). It will be seen at once that, in the specimens from *E. americana*, the inner branch of these peculiar appendages is shorter and stouter than in the specimens from *E. Krohnii*. These figures illustrate incidentally the most frequent position of the limbs in preserved specimens. I cannot decide at present whether this difference is of specific value. In the first place, the host of the type specimen must be considered uncertain, in the light of Hansen's recent work. It was called *Euphausia pellucida* by Sars, but Hansen has shown that Sars confused several distinct species under that name. The host of the type specimen was taken in the North Atlantic, near to Cape Verde. This is just the locality given by Hansen for *E. americana*, and though there is no improbability that the specimen is a true *E. Krohnii*, it is more probable that it is *E. americana*, the same species from which the present specimens were taken. I have examined the type host and parasite in the British

Museum, but they are mounted in Canada balsam, and are only to be seen in lateral view. It was not possible to make sure either of the species of the host or the form of the legs in the parasite. Until this matter can be settled, it is not desirable to consider the differences noted above as specific. If the type host is *E. Krohnii*, the differences can only be regarded as varietal; but, if *E. americana*, the grounds for considering them specific are strengthened. On the principle enunciated by GIARD and BONNIER, each species of host has a separate species of parasite. The genus *Heterophryxus* would seem to be a favourable one in which to test the truth of this axiom, for the form and shape of the last pair of legs seem to afford more definite characters than are usually to be found in the species of this group. It would be necessary to examine a large number of specimens taken from definitely and accurately named hosts, to decide the point. In the meantime, it seems to me to be best to refer the present specimens to the type species, with a note on the differences they exhibit.

Genus *Dajus*, Kröyer.

Dajus siriellæ, G. O. Sars.

D. siriellæ, G. O. Sars, 1885*a*.

Scotia.

Station 12, lat. 22° 19′ N., long. 22° 07′ W., tow-net.—Several in the Cryptoniscan stage.

Station 14, lat. 21° 28′ N., long. 22° 40′ W., tow-net.—One female, with two males attached, from the incubatory pouch of *Siriella Thompsonii.*

Station 56, lat. 0° 42′ S., long. 31° 20′ W., tow-net.—One female with male, free, but almost certainly from one of the thirty-eight specimens of *Siriella Thompsonii* in the same gathering.

Station 62, lat. 4° 15′ S., long. 33° 38′ W., tow-net.—Two females with males, from the incubatory pouch of *Siriella Thompsonii.*

This species was originally described by SARS from specimens taken from *Siriella Thompsonii* captured during the cruise of the *Challenger*. It has not, so far as I am aware, been recorded since that time, until last year, when HANSEN (1912) noted the presence of an Epicarid, probably this species, from the same host, captured in the Eastern Pacific.

The occurrence of two males with the same female is of interest.

SARS' type specimens, both male and female, were immature, the male being only in the Cryptoniscan stage. The present female specimens, presumably mature, have the incubatory pouch prolonged backwards in two bluntly rounded projections, which meet in the mid-ventral line and extend beyond the end of the pleon. The pouch is also prolonged in front beyond the head, on either side. The segmentation of the

body is distinct throughout, and there is no cordon for the support of the male. The pleon in the female is terminated by a pair of biramous uropods, not uniramous as figured by SARS. In this respect the species differs from the genus *Dajus*, to which it was referred by SARS, and it is possible that this difference may, in the future, be thought worthy of generic significance; but I do not feel able at present to go into the matter fully, as I have not enough material for the purpose. I do not know of any other genera of Dajiidæ in which the uropods of the female are biramous.

The adult male has the pleon unsegmented, narrow, pointed, and slightly curved, and terminated by a pair of uniramous uropods.

Both the adult male and the Cryptoniscan larvæ are characterised by the excessive development of dark pigment, so well illustrated in SARS' figure. This feature enables the larvæ to be identified in tow-net gatherings.

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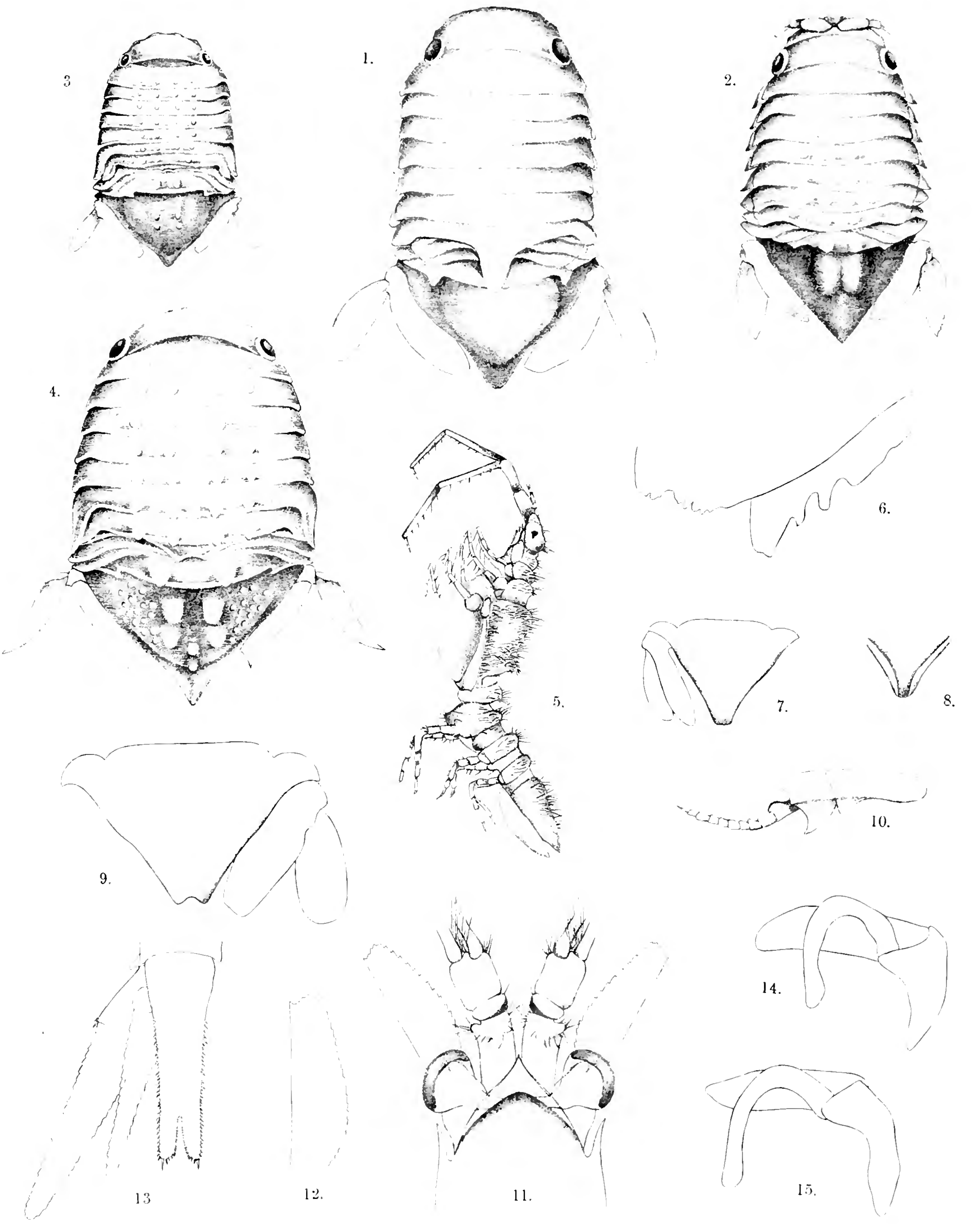
EXPLANATION OF THE PLATE.

Fig. 1. *Exosphæroma tristense* (Leach), male. × 8.
Fig. 2. *Exosphæroma Krausii*, sp. nov., female. × 8.
Fig. 3. *Exosphæroma Coatsii*, sp. nov., female, immature. × 8.
Fig. 4. *Exosphæroma Coatsii*, sp. nov., adult female. × 8.
Fig. 5. *Antarcturus ornatus*, sp. nov., female. × 10.
Fig. 6. *Exosphæroma Krausii*, sp. nov., extremities of the uropods.
Fig. 7. *Dynamenella* sp.?, telson and uropods, dorsal view.
Fig. 8. *Dynamenella* sp.?, telson, ventral view.
Fig. 9. *Dynamenella* sp.?, telson and uropods, dorsal view.
Fig. 10. *Dynamenella* sp.?, superior antenna.
Fig. 11. *Boreomysis Brucei*, sp. nov., dorsal view of anterior end.
Fig. 12. *Boreomysis Brucei*, sp. nov., antennal scale.
Fig. 13. *Boreomysis Brucei*, sp. nov., telson and uropods.
Fig. 14. *Heterophryxus appendiculatus*, G. O. Sars, last leg from a specimen taken from *Euphausia americana.*
Fig. 15. *Heterophryxus appendiculatus*, G. O. Sars, last leg of a North Atlantic specimen from *Euphausia Krohnii.*

NOTE ADDED IN THE PRESS.—While this paper was in the hands of the printers, I received a copy of HANSEN'S Report on the Crustacea Schizopoda of the Swedish Antarctic Expedition, but I have been unable to insert references to it in the main body of the text or to modify the latter in any way in accordance with HANSEN'S latest observations. Three new Antarctic Mysidæ are described, and further records of known species given.

TATTERSALL: "SCOTIA" SCHIZOPODA AND NON-ANTARCTIC ISOPODA.



W. M. T. and T. C., del.

M'Farlane & Erskine, Lith., Edin.

PART VIII.

POLYCHÆTA.

(Family NEREIDÆ.)

VIII.—POLYCHÆTA (Family NEREIDÆ) OF THE SCOTTISH NATIONAL ANTARCTIC EXPEDITION.

By L. N. G. RAMSAY, M.A., B.Sc.,
Carnegie Research Scholar, Christ's College, Cambridge.

(*WITH ONE PLATE.*)

VIII.—Polychæta of the family Nereidæ, collected by the Scottish National Antarctic Expedition (1902–1904). By L. N. G. Ramsay, M.A., B.Sc., Carnegie Research Scholar, Christ's College, Cambridge. *Communicated by* Dr. J. H. Ashworth. (With One Plate.)

(MS. received October 7, 1913. Read December 15, 1913. Issued separately March 30, 1914.)

The collection of Nereidæ brought home by the *Scotia* proves to be of considerable interest. As other expeditions have indicated, the family is but poorly represented in the antarctic or sub-antarctic regions; and although a large number of specimens were collected at the South Orkney Islands, these have all proved to belong to one species, *N. kerguelensis* M'Int. No nereids were obtained at any of the deep-water stations farther south—the family being decidedly littoral in its range.

The chief interest, however, lies in the material collected so assiduously throughout the vessel's wanderings. Six other species were obtained, including one from the Falkland Islands, hitherto undescribed.

The investigations of the more recent workers on the Nereidæ continually tend to widen the distribution of hitherto known species, and to link up forms which have been described as distinct—in some cases apparently from the supposition that it was inconceivable that one and the same species could inhabit areas so widely separated as, say, the Indian Ocean and the North Atlantic. It is becoming more and more evident, however, that in the determination of species, locality must not be taken into account. Several species are already recognised as having a range that is practically cosmopolitan (e.g. *N. dumerilii*, from the North Atlantic, North Pacific, and Persian Gulf; *N. mirabilis*, from the West Indies, Red Sea, Persian Gulf, and Malay Archipelago). It is therefore clear that the world-wide distribution of any particular species is a contingency that must be reckoned with.

The means of dispersal which render this world-wide distribution possible can only, for the present, be a matter of surmise; the carriage of pelagic larvæ by ocean currents may be sufficient to account for it; and in this connection, also, the investigations of the *Scotia* naturalists supply a very suggestive hint in the discovery of nereids living and breeding among floating gulf-weed in mid-Atlantic. These, it may be noted, have been described as a variety of the species *N. dumerilii*.

The excellent condition of the *Scotia* material has rendered its examination and the determination of the species comparatively easy. The descriptions following are in no case based on a single specimen; where only a few specimens were found, these were all examined in detail; where examples were numerous, the individual variation has been taken into account. This is of considerable importance, as the great latitude of indi-

vidual variation, in such characters as the numbers and grouping of paragnaths, and the relative lengths of appendages, has apparently led astray several former investigators of the group, and has resulted in the creation of a deplorable number of perfectly indistinguishable species. This is undoubtedly due in some measure to the laborious nature of the examination necessary for the adequate determination of the characters of a nereid.

In the preparation of this report, the extensive collections of Nereidæ in the Cambridge University zoological laboratories, hailing from all regions of the globe, have been of great assistance; for these I am indebted to Mr F. A. Potts. It may be mentioned here that the writer is at present engaged on a revision of the family as a whole, and on this account one or two points, such as the relationships of the species allied to *N. falklandica*, or of the species comprised in the sub-genus or group *Platynereis*, have not been discussed in the present paper.

I have to thank Professor J. Stanley Gardiner and Mr F. A. Potts for helpful advice. My best thanks are also due to Professor F. Jeffrey Bell for kindly allowing me access to the collections at the Natural History Museum for purposes of comparison; finally, to Dr W. S. Bruce himself for permitting me to examine the material.

Table of Species, with Localities.

Nereis kerguelensis M'Int. . . .	South Orkneys.
	Falkland Islands.
Nereis eugeniæ (Kbg.).	Falkland Islands.
Nereis mirabilis Kbg.	Brazilian coast.
Nereis pelagica Lin.	Cape of Good Hope.
Nereis falklandica n. sp. . . .	Falkland Islands.
Nereis australis (Schmarda). . . .	Falkland Islands.
	Cape of Good Hope.
Nereis dumerilii Aud. et Edw., subsp. nov. *comata*.	North Atlantic (mid-ocean).

Nereis kerguelensis M'Int.

Nereis kerguelensis M'Intosh (10), p. 225, pl. xxxv. figs. 10–12.

Station 325. Scotia Bay, South Orkneys; many specimens.

Station 118. One small specimen, Port Stanley, Falkland Islands, January 1903.

This species was the only representative of the Nereidæ obtained at the South Orkneys, where it was apparently fairly common in the littoral zone at Scotia Bay. Many specimens were collected in 9–10 fathoms; they are accompanied by tough membranous tubes in which they lived.

Two specimens from Scotia Bay (season ?) are undergoing change to the heteronereid form.

It appears to be a peculiarity of this species that the spinigerous setæ of the lower

neuropodial bundle are homogomph in form. This, at any rate, is constant in the Falkland Islands specimens, as well as in those from the South Orkneys.

N. kerguelensis has a wide distribution in the sub-antarctic regions, having been recorded from Kerguelen, South Georgia, the Falkland Islands, and the South Shetlands and Graham Land, besides the South Orkneys. Recently VON MARENZELLER (12, p. 15) has recorded specimens from the eastern Mediterranean, collected by the Austrian oceanographic vessel *Pola*, and he mentions also some from the Azores in the collections of the PRINCE OF MONACO.

Nereis eugeniæ (Kbg.) Char. emend. Ehl.

Nereis eugeniæ Ehlers, (3), p. 67, pl. iv. figs. 91–105.

Station 349. Two specimens, dredged in 15 fathoms, sandy bottom, off Tussock Islands, Falkland Islands, December 2, 1903.

These are both large specimens, and agree in all respects with EHLERS' full description and figures.

This species has been recorded from the shores of various parts of the southern extremity of South America, but not previously from the Falkland Islands.

Nereis (Ceratonereis) mirabilis Kbg.

Nereis (Ceratonereis) mirabilis, Ehlers, (2), p. 117, pl. xxxvii. figs. 1–6.

Station 81. One specimen, dredged in 36 fathoms, coral bottom, about 200 miles off the coast of Brazil, 18° 24′ S., 37° 58′ W., December 20, 1902.

It is a small example, incomplete posteriorly, and showing the characters typical of the species.

The type specimen of *N. mirabilis* was obtained off the Brazilian coast in 9° S. latitude (9, p. 170). The species has subsequently been recorded from Florida (2, p. 117), the Red Sea (7, p. 172), Porto Rico and Bermuda (13, p. 193), Amboina (14, p. 336), and the Persian Gulf (15, p. 392).

Nereis pelagica Lin. (Plate, figs. 1, 2.)

Nereis pelagica M'Intosh (11), p. 267, and figs.

Station 478. One example from the shore, Table Bay, South Africa, May 14, 1904.

Station 483. Two examples, trawled in 25 fathoms, sand and kelp, entrance to Saldanha Bay, South Africa, May 21, 1904.

The three are all small specimens, the largest being 25 mm. long; fortunately the proboscis is in all cases everted, and this greatly facilitates examination.

I can find no differences of importance between these and British specimens of *N. pelagica*; the general form of the body, the parapods, setæ, and the prostomium and its appendages all agree, as does the armature of the proboscis, except that the

ventral paragnaths of the basal ring (VII.–VIII.) do not exhibit an anterior row of markedly larger points, such as is usual in examples from Britain (*v.* figs. 1 and 2).

The noto-cirri are rather shorter than in typical British specimens, but nevertheless overreach the noto-ligules all along the body.

N. lucipeta Ehl., from Great Fish Bay, some distance farther north, very closely resembles the present species, as EHLERS himself states (6, p. 71). EHLERS' specimens were all in the heteronereis condition, and his main grounds for separating the species from *pelagica* were: the swollen outline of the noto-cirri of the first seven pairs of parapods, the number of parapods in the anterior (unaltered) portion of the body, *i.e.* 19–20 pairs, and the longer tentacular cirri (the longest reaching to the 9th–11th setigerous segment).

I have before me a small example of *N. pelagica*, obtained at Plymouth in March 1913, 25 mm. in length, and in the heteronereis condition; this specimen, as regards the parapods and their modifications, exactly agrees with EHLERS' description and figures of *N. lucipeta*. The change in the form of the parapods occurs at the 21st pair, and the 1st–7th pairs—of the anterior region—have the basal part of the noto-cirrus swollen to a sausage shape, and terminate in a short, unswollen tip, exactly as figured by EHLERS for *N. lucipeta*.

The length of the tentacular cirri is not of much importance, as it is subject to considerable variation.

While the present record forms an important extension of the known range of *N. pelagica*, it is not surprising that the species should be found to occur on the coasts of South Africa, as it has previously been reported from such widely separated regions as northern Europe, the northern Pacific (both the Japanese and American shores), and the west coast of South America.

Nereis (Perineris) falklandica, n. sp. (Plate, figs. 3–10.)

Station 118. One specimen, Port Stanley, Falkland Islands.

Station 349. One specimen, dredged off Tussock Islands, Falkland Islands, in 15 fathoms, sandy bottom, December 2, 1903.

These two are in excellent preservation, but one is incomplete posteriorly. The complete example measures 80 mm. in length by 6 mm. in width over parapods. There are 93 setigerous segments; the width hardly decreases till the 80th, behind which the body rapidly tapers. The other example is smaller.

The anal cirri are very short, as are also the peristomial cirri. In the preserved animal (in alcohol) the tentacles and peristomial cirri are livid, in marked contrast to the deeply-pigmented prostomium; the palps and the basal divisions of the peristomial cirri are intermediate in colour, or slightly pigmented. The eyes are unusually small, and each is surrounded by a pale ring. In the incomplete specimen the pigment is more developed than in the larger one, and the dorsal surface of the body-segments

is dull purplish-brown like the head. In the other the body is practically unpigmented, although the head agrees with the above description (*v.* fig. 3).

The proboscis (figs. 4, 5) was in both cases retracted, but owing to the good preservation of the specimens, examination by dissection gave very satisfactory results. The two were found to be identical as to the form and arrangement of the paragnaths. These, numerous, black and conical, and of very diverse size, are arranged as follows:—

I. An irregular area of numerous very minute black points, with a few larger ones situated medio-anteriorly.

II. A closely-packed triangular group of about fifteen large paragnaths.

III. A small close-set transverse group of about ten, of fairly large size.

IV. About twenty-five, of varying size, forming a transversely-elongate group.

V. One large median paragnath.

VI. One large paragnath, slightly elongate transversely.

VII.–VIII. A wide band of very numerous cones, smallest and most numerous in the mid-ventral region, becoming fewer and larger towards the dorsum and also towards the anterior margin of the belt, and extending dorsalwards nearly to VI.

The jaws are nearly black, opaque, with one big "tooth" or notch near the tip, the remainder of the cutting edge being only slightly crenate (fig. 6).

In the anterior region of the body the lobes of the parapods are short, stout, rounded, and of more or less even size. Proceeding towards the posterior end, a gradual transition of form takes place; the base of the dorsal ligule becomes enlarged and more enlarged, assuming an oblong form and carrying the cirrus with it; the rounded tip of the ligule projecting below the cirrus becomes less prominent. At the same time the lower lobes of the parapod are reduced in size, especially the ventral ligule (figs. 8–9). Thus the outline of the parapods changes gradually from a quadrangular to a triangular one.

The setæ, numerous, short, closely-packed, and of a horny yellow colour, are thus distributed:—

A. Notopodial bundle: homogomph spinigers.

B. Upper neuropodial bundle: homogomph spinigers (above).

,, ,, heterogomph falcigers (below).

C. Lower neuropodial bundle: heterogomph falcigers.

The heterogomph spinigers which appear on the upper margin of C in most species of *Nereis* have apparently been eliminated. The bristles do not vary appreciably in form from the 1st parapod to the 70th at least. The falcigers have stout shafts, and short stout appendages (fig. 10).

In the general external form, and in the characters of the parapodia, setæ, and the prostomium and its appendages, the present species closely resembles *N. variegata* Gru., and others of the same group: *N. marionii* A. et E. (11, p. 295), *N. melanocephala* M'Int. (10, p. 216), *N.* (*Pseudonereis*) *anomala* Grav. (7), *N. ruficeps* Ehl. (6),

N. gallapagensis Kbg. (8). From all these, however, the armature of the proboscis exhibits considerable differences. No other species of nereid, to my knowledge, exhibits a similar arrangement in group I., *i.e.* very numerous, minute, scattered conical paragnaths. Again, there is in *N. falklandica* none of the markedly pectiniform arrangement of the paragnaths of groups II., III., and IV. exhibited by *N. variegata*, *N. anomala*, and *N. gallapagensis*. VII.–VIII. also are distinctive.

This group of species, in common with the rest of the family, stands in considerable need of revision. In the case of *N. variegata*, two different types appear to have been confused under the one name by different authors.

Nereis (*Platynereis*) *australis* (Schmarda).

Nereis (*Platynereis*) *australis*, Ehlers (5), p. 26, pl. iii. f. 16–20, iv. f. 1–2.

Station 349. One specimen, dredged in 15 fathoms, sandy bottom, off Tussock Islands, Falkland Islands, December 2, 1903.

Station 118. One specimen, Port Stanley, Falkland Islands, January 1903.

Station 478. One specimen, shore, Table Bay, South Africa, May 1903.

Station 482. Four examples, in 2–8 fathoms, shells and sand, Houtjes Bay, Saldanha Bay, South Africa, May 21, 1903.

Station 483. Numerous examples, in 25 fathoms, sand and kelp. Entrance to Saldanha Bay, South Africa, May 21, 1904.

The *Scotia* specimens are all small, none exceeding 4 mm. in width over pararodia, by about 50 mm. in length. None is in the heteronereid state. Some are accompanied by membranous tubes similar to those of *N. dumerilii*.

Ehlers (4, p. 104), and Benham (1, p. 238), have indicated the wide range of this species in the southern oceans, and reference should be made to these papers for the synonymy.

Nereis (*Platynereis*) *dumerilii*, Aud. et Edw., subsp. n. *comata*. (Plate, figs. 11–13.)

Nereis (*Platynereis*) *dumerilii*, M'Intosh (11), p. 302, and figs.

Station 536. 27° 23′ N., 33° 06′ W. One example, June 28, 1904.

Station 538. 32° 11′ N., 34° 10′ W. Two examples, June 30, 1904.

These were taken in mid-Atlantic, with the tow-net, among the floating gulf-weed of the Sargasso Sea. Those from Station 538 were in typical membranous tubes among the branches of the weed. They are small specimens, about 20 to 35 mm. long. One at least is full of ova.

The proboscis was in all cases inverted; the two larger specimens were therefore dissected; the proboscis of one of these, detached, flattened out and mounted in balsam, shows very clearly an armature of the type usual in *N. dumerilii*, that is, pectiniform series of paragnaths in the areas III., IV., VI., and VII.–VIII. The last are practically uniserial, and extend nearly half-way round the basal ring; but some short combs, each of a few teeth, occur in front, representing the more typical biserial arrangement.

The bristles are of the forms characteristic of *N. dumerilii*. Two or three homogomph falcigers, with free appendages, occur on the inferior margin of the notopodial bundle in the more posterior parapods.

The parapods (figs. 12–13) are of normal form, except that the notopodial cirri are of extraordinary length, and the neuro-setigerous lobe in the round-lobed parapods (5th–11th pairs) is more prominent than usual.

The noto-cirri are longest about the 15th–20th pairs, behind which they grow somewhat shorter. The neuro-cirri are also unusually long, distinctly overpassing the neuro-ligules.

The tentacular cirri are of great length, the longest reaching approximately to the 20th setigerous segment.

On the head there are peculiar markings (fig. 11): a broad ring of dark brown granular pigment exists on the basal joint of each of the palps, and a band of similar nature on the forehead surrounds the bases of the tentacles. Otherwise the specimens —preserved in alcohol—have lost their colour.

The extraordinary elongation of the parapodial and tentacular cirri in these examples seems to justify their being assigned a distinct sub-specific name. So far as I am aware, the only other species of nereid which shows a similar development of cirri is *N. mirabilis*, a member of quite a different group.

Judging from the position in mid-Atlantic where these worms were collected, one may suppose they had drifted across from the neighbourhood of the Gulf of Mexico with the south-west wind drift; but whether this variety of *N. dumerilii* characterised by such peculiarly elongate cirri has been evolved solely under the conditions of the drifting weed of the Sargasso Sea, or whether it is also to be found in the littoral areas of the seas of Central America, is a matter for future investigation.

EXPLANATION OF PLATE.

Figs. 1 and 2. *Nereis pelagica*, Lin. South Africa.

Fig. 1. Head and everted proboscis, dorsal view. × 18.
,, 2. Proboscis everted, ventral view. × 18.

Figs. 3 to 10. *N. falklandica*, n. sp. Falkland Islands.

Fig. 3. Head, from above. × 15.
,, 4. Maxillary ring of proboscis, dissected from the ventral side. × 15.
,, 5. Basal ring, dissected from ventral side. × 15.
,, 6. Jaw dissected out, ventral aspect. × 15.
,, 7. 10th parapodium. × 21.
,, 8. 51st ,, × 21.
,, 9. 70th ,, × 21.
,, 10. Falcigerous seta, from inferior neuropodial bundle of 10th parapodium. Zeiss 4 D.

Figs. 11 to 13. *N. dumerilii*, A. et E., subsp. n. *comata*. Sargasso Sea.

Fig. 11. Anterior extremity from above. × 17.
,, 12. 8th parapodium. × 32.
,, 13. 14th ,, × 32.

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Ramsay: "Scotia" Nereidæ.

L. N. G. R. del.

M'Farlane & Erskine Lith. Edin.

PART IX.

CHÆTOGNATHA.

IX.—THE CHÆTOGNATHA OF THE SCOTTISH NATIONAL ANTARCTIC EXPEDITION.

By A. PRINGLE JAMESON, B.Sc.

(*WITH CHART IN TEXT.*)

IX.—The Chætognatha of the Scottish National Antarctic Expedition of 1902–1904. By A. Pringle Jameson, B.Sc. *Communicated by* Dr W. S. Bruce.

(MS. received June 21, 1913. Read July 21, 1913. Issued separately February 24, 1914.)

A considerable number of Chætognatha were collected on the Scottish National Antarctic Expedition of 1902–1904. Some two or three hundred tow-nettings were examined, and about ninety yielded some of these forms. Beside the tow-netting samples there were twelve tubes of these animals taken in the vertical net or the trawl.

It will thus be seen that most of the material consists of tow-nettings which, almost without exception, were taken at the surface of the water. If we accept Dr Bruce's definition of the Antarctic Regions,* namely, the area to the south of the *average* limit of floating ice according to the British Admiralty Ice Chart, No. 1241 (*vide* text-map), we may expect Antarctic forms there. Chætognatha were taken by the *Scotia* at ten stations south of this line, including only four out of the many surface tow-nettings taken by the *Scotia* south of this line, whilst a fifth, although taken in latitude 39° 48′ S. (Station 468), is in close proximity to it, and actually within the *extreme* limit of floating ice. The ten stations are Nos. 273, 280, 325, 346, 398, 414, 416, 422, 448, 450, and besides the eleventh above mentioned, viz. 468.

The Antarctic species are :—

1. *Sagitta gazellæ* (Ritter-Zahony).
2. *Sagitta maxima* (Conant).
3. *Sagitta planctonis* (Steinhaus).
4. *Eukrohnia hamata* (Möbius).
5. *Heterokrohnia* sp.? (Ritter-Zahony).

The catches of the vertical net and the trawl were, with one exception—namely, the trawling made on April 29, 1904, in 39° 48′ S., 2° 33′ E.—taken south of 40° S. and south of the average limit of floating ice. Thus this one catch is hardly an exception, so that practically we may say all these catches belong to the Antarctic series. All the other Chætognatha captured were taken north of this line as far north as 36° N. latitude.

The tropical and sub-tropical species are :—

1. *Sagitta hexaptera* (d'Orbigny).
2. *Sagitta enflata* (Grassi).
3. *Sagitta serratodentata* (Krohn).
4. *Sagitta bipunctata* (Quoy and Gaimard).
5. *Sagitta robusta* (Doncaster)
6. *Pterosagitta draco* (Krohn).
7. *Krohnitta subtilis* (Grassi).

* "Antarctic Birds," by William S. Bruce, *Knowledge*, September 1, 1894, p. 208.

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SMITHSONIAN

Thus the collection is divided into two sections, one a general collection from the colder waters of the South Atlantic and Antarctic Seas, the other a series of surface tow-nettings made in tropical and sub-tropical Atlantic waters. These two sections

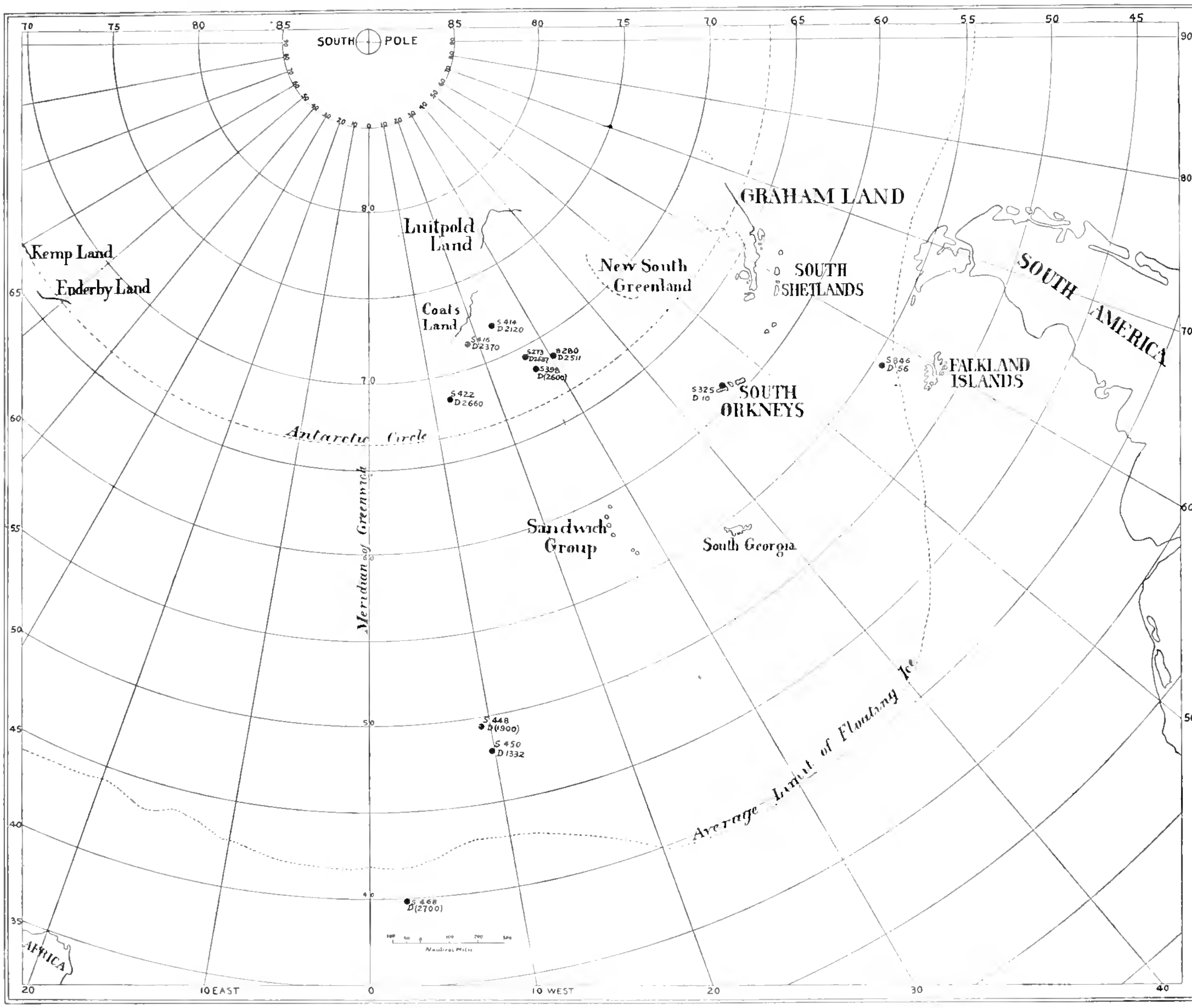

Chart showing average limit of floating ice in the Atlantic Ocean and Stations to the south of which Chætognatha were obtained.
S = Station. D = Depth in fathoms.

prove on examination to be more than a merely convenient grouping of the methods of capture—they form two distinct sets of species: the species which occur in the Antarctic samples not occurring in those from the warmer seas, and those taken in the warmer waters of the Atlantic never being found in the Antarctic collections. Doubtless the fact that only a small number of Chætognatha were obtained from

these colder waters is responsible for this very sharp division, and it must also be remembered that if collections had been made from the depths of the tropical and sub-tropical Atlantic these would naturally have yielded cold-water forms. Yet, despite these facts, this sharp line dividing the present collection into two distinct groups serves as a very clear example of how great a part temperature plays in the distribution of plankton organisms.

In the *Scotia* collections made south of 40° S. there are found five species of Chætognatha—*Sagitta gazellæ*, *Sagitta maxima*, *Sagitta planctonis*, *Eukrohnia hamata*, and possibly a species of *Heterokrohnia*. These are all typically cold-water forms; their presence in these latitudes was to be expected, and adds nothing to our knowledge of their distribution, all these species having been found by the German South Polar Expedition (1901–03) under very much the same conditions. *Eukrohnia fowleri* is a type which one might have expected to meet with, but it was not present in this collection. *Sagitta hexaptera*, *Sagitta serratodentata*, and *Krohnitta subtilis* have all been reported from the seas south of 40° S., but they do not seem to be typical Antarctic species, only occasional specimens being got. None of these was present in the *Scotia* material from this area.

The remaining species, seven in number, were all taken between roughly 36° N. lat. and 38° S. lat., and were thus living under tropical and sub-tropical conditions. Many of the specimens were small and evidently immature, thus supporting Gunther's view that large, mature individuals occur at some distance below the surface, only small and mostly immature specimens being obtained from the very uppermost layers of the sea.

No species new to science was discovered, the only noteworthy feature of the collection being the very large size of four specimens of *Sagitta gazellæ*. These four specimens seem to be the largest recorded for the species, and the largest of all is probably the largest "Arrow Worm" that has been captured up to the present time. Detailed measurements of this specimen are given under the notes of this species.

The difficulty of identifying Chætognatha has within recent years been considerably lessened by the excellent papers of Fowler and Ritter-Zahony on this class. These have been of the greatest service, and I desire to express my great obligation to these two authors. In selecting features for aid in identification Fowler has been followed in his introduction to the Chætognatha of the Biscayan Plankton (1905), where a most helpful discussion of this difficult subject is given. As a rule, tables of measurements and numbers of jaws and teeth have been given only when the species has not been frequently described, or where there might be any doubt as to the identification. It seemed to be fruitless to expand these notes unduly by including figures which had been given frequently before, and which were quite typical and did not add to our knowledge of the species in any way. It may be mentioned that the measurement of length does not include the tail fin; as this was so frequently damaged, it seemed to be

more accurate to omit this altogether, and indeed it seems to be the custom of many investigators not to include this fin in their measurements.

As alcohol was the fluid in which the specimens were usually preserved, the identification has in many cases been attended by some considerable difficulty, for, as is now well known, the only successful method of preserving Chætognatha is by using formalin, as alcohol causes these animals to shrink very greatly and become opaque.*

Sagitta hexaptera (d'Orbigny).

This very well-marked species was taken at fifteen stations in the warmer Atlantic waters. It seems to be undoubtedly a tropical and sub-tropical species, as pointed out by Ritter-Zahony (1911), no specimens occurring in the Antarctic collections. Probably the forms of this species reported from the Antarctic are to be referred in great part to the somewhat nearly related species *S. gazellæ*.

Horizontal distribution: 22° 19′ N., 22° 07′ W.–15° 54′ S., 4° 59′ W.

Vertical distribution: surface.

Temperature range: 72·2°–80·5° F.

Stations: 12, 13, 14, 17, 19, 36, 54, 56, 59, 60, 62, 69, 498, 501.

Sagitta gazellæ (Ritter-Zahony).

This was the most abundant Antarctic form found; over a dozen easily identified specimens were got, and a considerable number of fragmentary or badly distorted forms are probably to be referred to this species.

It seems somewhat strange that this species, which is well marked and apparently abundant, should have been recorded so rarely. The species was first established by Ritter-Zahony in 1909 from the material of the *Gazelle* expedition, and it was also found very abundantly in the collections made by the German South Polar Expedition (1901–1903). Some of the forms described by Fowler (1907) as *S. hexaptera*, from the material of the British Antarctic Expedition (1901–1904), and others unnamed, from New Zealand (Fowler, 1908), have been assigned to this species by Ritter-Zahony (1911).

The most characteristic features of this species are undoubtedly those which suffer most in preservation. Among the smaller forms the tail-percentage and the number of teeth and jaws are sometimes very similar to those of young *S. hexaptera*, consequently immature specimens of the two species are very likely to be confused. With larger forms these features become extremely characteristic for both species, and all likelihood of confusion disappears. The diagnostic features which seem to be of most assistance in identifying the species are the following:—The tail-percentage is characteristically low, about 12–14 per cent. for the larger specimens; the anterior fin is comparatively

* Alcohol was used as a preserving medium on account of its suitability over formalin for the majority of organisms in the plankton. W. S. B.

large, very much longer in proportion than that of *S. hexaptera*, and almost touching the posterior fin; the anterior teeth are small, somewhat conical in shape, and overlap one another, quite unlike the long divergent teeth of *S. hexaptera*; the teeth are few in number in young forms and more numerous in older ones, the reverse being true with *S. hexaptera*; the anus is situated well in front of the tail septum. In the *Scotia* specimens the position of the seminal vesicles is a little different from that described by RITTER-ZAHONY; they hardly extend as far forward as the posterior fin, and the tail fin is only slightly removed from them.

Some of the specimens in this collection are noteworthy on account of their very large size; indeed, one of them seems to be the largest "Arrow Worm" that has been taken up to the present time. Five specimens were over 70 mm. in length, the largest of all being no less than 90 mm. long. Some measurement of this relatively enormous animal may help to give an idea of its size. The length exclusive of the tail fin is 88 mm., the tail fin being at least 2 mm. long, but as it is damaged rather badly it was very probably somewhat longer than this. In any case the total length of the animal is certainly not less than 90 mm. The tail portion, exclusive of the fin, is 11 mm. The size of the head is of little importance, as this varies so much according to the state of contraction, but it may be mentioned that in this specimen the head is 4 mm. long and 6 mm. broad. The broadest part of the body is 8 mm. in width, and this point is in the region of the ventral ganglion, 22 mm. from the tip of the head. From this point the body tapers gradually towards the tail and somewhat more abruptly towards the head, the body being 3 mm. in width at the tail septum and 4·5 mm. at

Length.	Tail-percentage.	Jaws.	Ant. Teeth.	Post. Teeth.
88	12·5	5	5	?
80	12·5	6	7	9
79	12·6	6	5	?
78	12·9	5	7	9
72	12·5	6	7	5 +
65	11·5	6	9	10
60	14	5	8	9
59	13	5 +	5 +	?
58	? 15·5	7	7	11
54	13	8	5	9
50	14	8	8	9
47	12·8	7	7	9
42	13	7	4	8
40	12	10	6	?
33	15	7	4	5

the neck. The anterior fin commences 5 mm. behind the posterior end of the ventral ganglion—the ganglion itself is 2 mm. long—and extends backwards for about 29 mm.; there is a space of about 5 mm. between the anterior and the posterior fins; the posterior fin is about 17 mm. long, and lies almost entirely on the trunk portion of the

body, there being only 3 mm. of the fin on the tail. As the fins are rather badly damaged it is impossible to be quite certain of the accuracy of these measurements, and no idea of the breadth of the fins can be formed. The jaws are 3 mm. long. The reproductive organs are prominent, but they do not seem to be quite mature; the ovaries extend forward for a length of 16 mm.

Horizontal distribution: 39° 48′ S., 2° 33′ E. (depth 2772 fathoms), Station 468. 71° 22′ S., 18° 15′ W. (depth 2370 fathoms), Station 416.

Vertical distribution: surface (3 fathoms)—2772 fathoms.

Temperature range: 31°–41°·8 F. (only 3 records).

Most of the specimens were obtained from deep water ranging in depth from 600–2772 fathoms. In Scotia Bay, South Orkneys, Station 325, one medium-sized specimen was obtained in a tow-net at 3–10 fathoms; while on Burdwood Bank, Station 346, another medium-sized specimen was obtained from 56 fathoms. These are the only "surface-water" records; all the rest, as far as data are given, are from deep water, and with one exception were from south of 50° S.

Sagitta maxima (Conant).

Two specimens which seem to be referable to this species were obtained, one in the trawl, the other in a vertical net. The tail-percentage and the number of jaws are a little lower than those usually given for this species, but otherwise these two specimens agree very closely with the descriptions of *S. maxima*. The somewhat widely separated, slightly curved anterior teeth, the prominent vestibular ridge with large mammiform papillæ, the fins without fin rays in the inner portions, and the very considerable distance between the anus and the tail septum, all seem to be minor features which taken together are characteristic of the species and help considerably in its identification.

Length.	Tail-percentage.	Jaws.	Ant. Teeth.	Post. Teeth.
53	18	5	? 3+	6
39	21	5	6	7

The vertical plankton-net haul was made at Station 414, 71° 50′ S., 23° 30′ W., and the net was lowered to a depth of 1000 fathoms and raised to the surface. The dredged specimen was obtained from Station 450, 48° 00′ S., 9° 50′ W., at a depth of 1332 fathoms.

Sagitta enflata (Grassi).

This very typical tropical and sub-tropical species was obtained from twenty-nine stations distributed over the warmer parts of the Atlantic. It was rather interesting

to note that, although this animal has a very delicate and rather flaccid body, it seems to suffer from the effects of preserving fluids less than most of the Chaetognatha.

The specimens were all very typical and call for no comment.

Horizontal distribution: 26° 23′ N., 20° 20′ W.–30° 5′ S., 45° 28′ W.

Vertical distribution: surface.

Temperature range: 72°–81·5° F.

Stations: 7, 12, 15, 18, 19, 21, 25, 26, 27, 29, 32, 33, 35, 36, 37, 39, 44, 46, 47, 64, 66, 73, 86, 93, 506, 515, 525, 526.

Sagitta serratodentata (Krohn).

The above widely distributed and well-marked species was found in fifty-nine tow-nettings. It was thus present in more samples than any other species, and, in addition, it was very frequently more abundant than the other species in the haul; indeed, the only species which was ever as numerous as this was *S. bipunctata*, but this last was only occasionally obtained in considerable numbers, so that on the whole *S. serratodentata* was the form most typically found in the surface tow-nettings. It is to be noted, however, that no specimens of this species were taken south of 40° S., although it has been found by other expeditions as far south as Magellan Straits and the Falkland Islands.

Horizontal distribution: 26° 23′ N., 20° 20′ W.–38° 6′ S., 14° 32′ E.

Vertical distribution: surface.

Temperature range: 64·9°–81·5° F.

Stations: 7, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 25, 26, 27, 28, 29, 31, 32, 33, 35, 36, 37, 38, 39, 41, 44, 46, 47, 49, 54, 55, 56, 58, 59, 60, 61, 62, 63, 64, 71, 87, 88, 90, 93, 94, 95, 473, 476, 498, 501, 502, 504, 506, 515, 519, 524, 526, 529.

Sagitta bipunctata (Quoy and Gaimard).

This common species was fairly frequently met with, having been found in fifty-four samples. On one occasion only was it taken in very considerable numbers; this was at a point eight miles from Cape Peninsula, South Africa, where a surface haul of some ten minutes' duration captured several hundred specimens. As a rule, however, the specimens taken in any individual haul were not numerous, and were rather small in size. It has been found impossible to determine exactly what stations might be called coastwise, so that this collection can throw but little light on the question put forward by Steinhaus (1896) as to whether this is mainly a neritic form or not. *Sagitta bipunctata* seems certainly to be found under oceanic conditions; but it may be noted that in the only haul mentioned as being taken very near land—the one above—this species appeared to the exclusion of all others, and the specimens captured were larger than most of those taken at other stations. As far as can be judged, also, the members of this species caught on the high seas were usually rather small in size and immature.

Horizontal distribution : 36° 5′ N., 30° 50′ W.–34° 43′ S., 17° 15′ E.

Vertical distribution : surface.

Temperature range : 61·3°–81·5° F.

Stations : 7, 8, 13, 17, 18, 20, 21, 22, 25, 26, 27, 28, 30, 31, 35, 37, 38, 39, 41, 42, 44, 47, 49, 59, 65, 66, 69, 70, 72, 82, 85, 86, 87, 90, 91, 93, 94, 95, 476, 477, 498, 501, 502, 506, 510, 511, 515, 522, 524, 525, 526, 529, 533, 540.

Sagitta robusta (Doncaster).

Considerable difficulty was experienced in identifying this species, and even yet the results do not seem to be quite satisfactory, for young forms of *Sagitta robusta* are rather liable to be confused with *Sagitta bipunctata* on account of a certain correspondence between the tail-percentages and the numbers of the jaws and teeth of these two species. This confusion, of course, does not arise when the specimens are in good order, and when all the features are clearly seen ; but damaged and strongly contracted specimens of *S. robusta* are frequently very like *S. bipunctata*, and require some care in determination. The features on which I have relied for the identification of this species have been the small number of the jaws, never more than seven —Ritter-Zahony (1911) in his monograph admits species with eight jaws, but under the circumstances I have thought it best to fix seven as the typical number ; the presence of a distinct collarette ; and an opaque body, all the parts of which, including the teeth and the jaws, are of a stout build. An important feature would seem to be the position of the seminal vesicles near or touching the posterior fins, but unfortunately seminal vesicles were not observed in any of the specimens.

Length.	Tail-percentage.	Jaws.	Ant. Teeth.	Post. Teeth.
? 14	?	7	8	12
13·5	26	7	7	? 10
12	25	7	6 or 7	12
11	27	7	7	12
8	28	7	6	13

Horizontal distribution : 32° 11′ N., 34° 10′ W.–23° 8′ S., 39° 40′ W.

Vertical distribution : surface.

Temperature range : 74°–81·5° F.

Stations : 15, 18, 19, 26, 29, 33, 39, 60, 73, 85, 526, 538.

It may be noted that *S. robusta* is said to have a smaller temperature range than *S. bipunctata*, or at all events that it does not range so far to the north and south. So far as my results go they bear out this statement.

Sagitta planctonis (Steinhaus).

Three specimens, taken at one station in the Antarctic Ocean, are probably to be referred to this species. The tail-percentage and the numbers of the teeth and jaws agree with those given by RITTER-ZAHONY, and the general habit—the stiff opaque body—seems to be the same. A very characteristic feature of these specimens is the size and arrangement of the anterior teeth: these are long towards the inner end and considerably shorter towards the outer end of each row; they do not overlap, but each tooth is distinctly seen in every part; these features are all admirably seen in a figure given by RITTER-ZAHONY (1911). As the specimens are small and young, the collarette is only slightly developed.

Length.	Tail-percentage.	Jaws.	Ant. Teeth.	Post. Teeth.
12	25	9	5	10
8	25	10	4	8

This species is given by FOWLER (1906) as a tropical surface form, but it was repeatedly taken in the Antarctic on the German South Polar Expedition, even as far south as 66° S. (RITTER-ZAHONY, 1911), so that its occurrence in the *Scotia* Antarctic collections is not an isolated case. Its furthest south range is, however, extended by about three degrees.

Station: 280, 68° 40′ S., 30° 18′ W. Between surface and 500 fathoms.

Temperature: 32·65° F.

Pterosagitta draco (Krohn).

Only a few specimens of this apparently common and typical tropical and subtropical form were obtained at seven stations. This scarcity is probably due to the fact that *P. draco* does not commonly occur at the very surface of the sea, but usually at some little depth. This point would seem to be in agreement with the results of the German South Polar Expedition (RITTER-ZAHONY, 1911), where this species was got only twice in the surface tow-nets, whereas it frequently occurred in the vertical nets.

Horizontal distribution: 26° 23′ N., 20° 20′ W.–38° 6′ S., 14° 32′ E.

Vertical distribution: surface.

Temperature range: 64·9°–78·6° F.

Stations: 7, 11, 12, 14, 26, 56, 473.

Eukrohnia hamata (Möbius).

It might have been expected that this form would have been taken very frequently in the higher latitudes, but, strange to say, it has been found in only six samples. The specimens found were in every way typical.

Horizontal distribution: 49° 25′ S., 9° 21′ W.–69° 22′ S., 26° 36′ W.
Vertical distribution: 800 fathoms–surface.
Temperature range: 28·9°–39° F.
Stations: 273, 280, 448, 325 (2) vertical net 23/3/04, 422.

? *Heterokrohnia* sp. (Ritter-Zahony).

A single specimen taken in a vertical-net haul might possibly belong to this genus; the state of preservation, however, will not admit of any certain determination.

The body is slender and firm. Transverse muscles are developed both in the trunk and in the tail. The lateral fins are almost totally destroyed, but there does not seem to have been more than one pair. The tail fin is also much damaged, but it appears to have been somewhat rounded and is very full of fin-rays. The percentage of tail to body length is probably about 25·6; the lowest percentage given by Ritter-Zahony (1911) is 32·3. The head is not well expanded, so that the teeth and anterior portion are not well seen. There are certainly not fewer than 14 posterior teeth. There are at least 11 jaws, rather long, slender, and knife-like, and only slightly curved, in general somewhat like a scythe blade.

On the whole, these features are those given by Ritter-Zahony in his diagnosis of this new genus *Heterokrohnia*. Indeed, the presence of transverse muscles in both trunk and tail would seem to be enough to determine the genus. It is, however, impossible to determine the species. The only species described is *H. mirabilis*, characterised by a high tail-percentage, and very numerous anterior and posterior teeth. This specimen does not show these features clearly enough to warrant any statement being made as to the species.

Length.	Tail-percentage.	Jaws.	Ant. Teeth.	Post. Teeth.
22·5	25·6	11	?	? 14

Taken in a vertical net on February 29, 1904, at Station 398, 68° 25′ S., 27° 10′ W. Surface temperature 30° F., and temperature at 1000 fathoms probably about 32° F.

Krohnitta subtilis (Grassi).

Specimens of this species were not abundant; it was found in only seven samples, and there only in small numbers. The explanation of this apparent rarity is probably to be found in the fact, pointed out by Fowler (1906), that this is a species which has its habitat in cooler waters of the "lower epiplankton and upper mesoplankton," seeming to avoid "the warmer surface water." One would naturally expect that such a form would be taken only rarely in surface tow-nettings. Further, the specimens obtained were all very evidently young forms, the largest being 5·5 mm. in length.

Fowler (1906) gives the most southerly point at which *K. subtilis* had been taken in the Atlantic up to that date as 25° 39′ S., 36° 51′ W., but since then Ritter-Zahony (1911) reports one specimen taken as far south as 60° S.; the furthest south record for the *Scotia* collection is 30° 25′ S., 45° 45′ W.

Horizontal distribution: 23° 50′ N., 21° 34′ W.–30° 25′ S., 45° 45′ W.

Vertical distribution: surface.

Temperature range: 73°–81° F.

Stations: 11, 17, 32, 33, 38, 94, 519.

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Full bibliographies are given by Fowler (1906) and Ritter-Zahony (1911). The following have been mentioned specially in the preceding text:—

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PART X.

SEA-ANEMONES.

(Genus Porponia and Related Genera.)

X.—THE ACTINIÆ

(GENUS PORPONIA AND RELATED GENERA)

OF THE SCOTTISH NATIONAL ANTARCTIC EXPEDITION.

BY OSKAR CARLGREN,

Professor in the Zoological Institution of the University of Lund.

(*WITH ONE PLATE AND EIGHT TEXT-FIGURES.*)

X.—On the Genus Porponia and Related Genera, Scottish National Antarctic Expedition. By Professor **Oskar Carlgren**, Universitetets Zoologiska Institution, Lund. *Communicated by* Dr W. S. BRUCE. (With One Plate and Text-figures.)

(MS. received August 12, 1913. Read January 19, 1914. Issued separately March 30, 1914.)

In an Appendix to the Actiniæ of the *Challenger* Expedition, R. HERTWIG, 1882, described a peculiar genus, *Porponia*, with two species, *P. elongata* and *P. robusta*, which he characterises in the following manner: "Actiniarien (Hexactinien?) mit 2 Schlundrinnen ohne Ringmuskel, mit dünnwandigen Tentakeln, deren Basen auf der äusseren Seite durch spangenförmige Verlängerungen des Mauerblatts gestützt werden." Partly owing to the badly preserved material, however, he did not venture to indicate definitely its systematic position, though he considered it conceivable that it represented a transitional form between the Zoanthidæ and the true Actiniæ, or Hexactiniæ. HERTWIG expresses the following opinion regarding the systematic position of the genus: "Die doppelreihige Stellung der Tentakel, die Abwesenheit vollständiger Geschlechtsepten (Macrosepten) und unvollständiger, sterilen Septen (Microsepten) sind Merkmale, welche an die Zoantheen erinnern, die Zahlen der Tentakel und der Septen passen ebenfalls am meisten für diese Gruppe, da sie weder von dem Numerus 6 wie bei den Hexactinien noch von dem Numerus 4 wie bei den Paractinien bestimmt sind. Auf der anderen Seite nähert sich die *P. elongata* durch den Besitz von zwei Schlundrinnen wieder mehr den Hexactinien, unter denen sie am meisten mit den Antheomorphiden übereinstimmt. Ich halte es daher für sehr wahrscheinlich, dass *P. elongata* eine Mittelform ist, welche den Übergang von den Hexactinien zu den Zoantheen bildet." *Porponia* possibly, he thinks, belongs to the Antheomorphidæ, a family supposed to be separated from the family Antheadæ chiefly by the absence of a sphincter and by the weak development of the musculature.

Since R. HERTWIG described this genus, it has not been made the subject of any close examination, nor for this reason has its systematic position been discussed in detail. Yet it is only right to mention that M'MURRICH was inclined to refer the genus *Halcurias* (*Endocœlactis*) to the neighbourhood of *Porponia*. "In fact," he writes (p. 226, 1898), "I was inclined at first to associate it (*Halcurias*) with *Porponia*, and was only deterred from doing so by the simplicity of the arrangement of the mesenteries." (That *Halcurias* possesses a peculiar arrangement of the mesenteries, which agrees with what I have described, 1897, for the genus *Endocœlactis*, was not known to M'MURRICH at that time.)

A closer examination of the material which I received for investigation from the

Scotia Expedition has proved, however, that the arrangement of the mesenteries, as also indeed a number of other characters, indicates a close relationship between *Halcurias* (*Endocœlactis*) and *Porponia*, though each genus has its own distinctive characteristics. They must of necessity be referred to the same family, though this cannot be the Antheomorphidæ set up by HERTWIG, with its genera *Antheomorphe* and *Ilyanthopsis*. As the following description will show, I have no hesitation in retaining the family set up by me, Endocœlactidæ, for *Halcurias* and *Porponia*.

After describing in detail the *Porponia* species of the *Scotia* Expedition, I shall discuss the mutual relationship of *Halcurias* and *Porponia*, and the position of the family Endocœlactidæ in the classification. At the same time I shall take the opportunity to discuss the genera *Antheomorphe* and *Ilyanthopsis*, as also the family Antheomorphidæ.

I. THE STRUCTURE OF PORPONIA ANTARCTICA, N. SP.

Place of discovery.—Off Coats Land, 71° 22′ S., 16° 34′ W., 1410 fathoms, 16th March 1904. 17 specimens.

Dimensions of the largest specimens.—Length 6–8 cm., breadth of the foot 3–4 cm., breadth of the disc 8–9 cm., length of the inner tentacles 3–7 cm.

External appearance.—The fresh colour is creamy white, tinged, especially on the tentacles, with pale lavender. The base is expanded and often attached to a round stone, which it more or less encloses; it is arranged in coarse, irregular folds, and secretes a fairly extensive cuticle.

The body-wall is more or less beaker-shaped, arising from the less or greater contraction of the individuals. The distal part of the animal is thus wider than the proximal, and that often to a fairly considerable extent. The thick body-wall is provided with irregular longitudinal and transverse furrows, by means of which it is divided into irregular areas, as a rule very prominent, since the thin ectoderm has fallen off from almost all the specimens. The distal, uneven edge of the body-wall is not marked off by any definite groove or line, but passes irregularly into the bases of the tentacles. In large specimens the tentacles are typically 68 * in number, yet this may be exceeded, as the arrangement of the tentacles and even the grouping of the mesenteries may be somewhat irregular in one quadrant (or several ?), resulting in a somewhat greater development of tentacles here than in the other quadrants. The tentacles have the appearance characteristic for *Porponia*; on the outer side they are greatly thickened and like cartilage; towards the oral disc, on the inner side, they are thin and resemble ordinary tentacles. Owing to the mesoglœa being greatly thickened on the outer sides of the tentacles, it looks as if the tentacles here were provided with bridge-like outshoots from the body-wall. Further, the tentacles are conical, curved

* The normal number of tentacles seems to be developed in the species at a comparatively early stage, as specimens of only half the size of the largest in the collection have already the typical number of tentacles. A small specimen, on the other hand, had considerably fewer tentacles; but as it was much damaged, I have not tried to ascertain exactly the number of tentacles or their arrangement.

like a sabre towards the oral disc, thick in the basal part but gradually narrowing towards the tip, and of moderate length. Their arrangement is irregular, and recalls

Fig. 1a.

Fig. 1b.

Fig. 1.—*Porponia antarctica*; A from the side, B from the disc.

the condition in *Halcurias* (*Endocœlactis*). In the latter genus the true arrangement is difficult to find, and this is even more the case in *Porponia* owing to the greatly swollen bases of the tentacles. So far as I could find, the arrangement of the tentacles

on each side of the sagittal plane is as follows: 1 (dt.), 2, 1, 4, 3, 5, 3, $\underline{4}$, 1, 2, 1, $\underline{4}$, 3, 5, 3, 4, 1, 2, 1, 4, 3, 5, 3, $\underline{4}$, 1, 2, 1, $\underline{4}$, 3, 5, 3, 4, 1, 2 = 34 (dt. = directive tentacle). Altogether, therefore, there should be 18 tentacles of the first order, 10 tentacles of the second, 16 of the third, 16 of the fourth, and 8 of the fifth. But it has to be remarked that some groups of tentacles of the first and second orders, namely, the 5 (1, 2, 1, 2, 1) in the sagittal plane on both sides of the angles of the mouth, and the 3 (1, 2, 1) on both sides in the transverse plane, arise somewhat further in than the other tentacles of the first and second order. The tentacles of the first order should therefore, perhaps, best be divided into 2 circlets (10 + 8), and similarly those of the second order into 2 (6 + 4). The underlined tentacles of the fourth order stand somewhat further out than the others of the fourth order. The arrangement of the tentacles is thus 18 (10 + 8) + 10 (6 + 4) + 16 + 16 (8 + 8) + 8 = 68 (text-fig. 2). As in *Halcurias*, the peculiar arrangement of the tentacles is connected with a characteristic dislocation of the mesenteries.

The oral disc is wide, expanded, marked by distinct radial furrows corresponding to the insertions of the mesenteries. The œsophagus is wide, oval, long, and provided with longitudinal furrows to a number of about 18. There are 2 œsophageal grooves, lying typically in the angles of the mouth, and broader in the aboral than in the oral part. No hyposulcus is developed.

Anatomical structure.—The ectoderm of the base is high, and consists chiefly of supporting cells, which secrete a fairly thick cuticle. The mesoglœa is extensive, as also the entoderm, in which the nervous system seems to be well developed.

The ectoderm of the body-wall by comparison with the thick mesoglœa is thin and provided with numerous spirocysts of varying size up to 60 μ long and 11 μ broad. Further, there are generally thick-walled capsules (length 26–34 μ, breadth 3 μ). In cross-section there seem to be thickenings at the base which resemble transversely cut muscles, but are probably in reality thickened basal parts of the ectodermal cells (see below under *Ilyanthopsis elegans*). The mesoglœa is thick, and provided with numerous small cells with outshoots. The entodermal musculature is weak, and no sphincter is present. The entoderm is thin like the ectoderm. The entoderm of the body-wall and of the œsophagus is pigmented.

The ectoderm of the tentacles is somewhat high, and contains fairly numerous spirocysts and thick-walled nematocysts (length 36–50 μ, breadth 3–(5) μ). The longitudinal musculature on the outer side of the tentacles is weak, but gradually becomes considerably stronger towards the inner side, so that the muscular wall is here about half the height of the supporting cells. The mesoglœa agrees in structure with that of the body-wall. On the inner side, in the lower part of the tentacles, it is, as a rule, just as thick as, or thicker than the ectoderm; on the outer side, however, it is much thickened (Plate, fig. 6). The thickness decreases towards the tips of the tentacles (Plate, fig. 5), so that at the ends the mesoglœa is almost equally developed round the tentacles. The entoderm is thin, and the ring-musculature weak. The radial muscula-

ture of the disc is in the ridges almost as well developed as the longitudinal musculature on the inner side of the tentacles, but in the furrows it is considerably feebler.

The ectoderm of the œsophagus shows the usual structure, but in addition numerous thick-walled nematocysts (length 43–48 μ, breadth 5 μ), and in fair numbers spirocysts of the same appearance as in the body-wall. The mesoglœa, which is very thick, agrees in structure with that of the body-wall.

The arrangement of the mesenteries is shown by the accompanying schematic fig. 2; 6 pairs of mesenteries of the first order, with 2 pairs of symmetrical, directive mesenteries are present. While all the primary exocœls are reduced, so that no mesenteries could be formed in them, each of the 4 lateral endocœls contains a pair of mesenteries of the second order, in which, however, the longitudinal muscles face outwards, as in the directive mesenteries. The mesenteries of the first and second order, all of which are perfect, are thus 20 altogether; of these 16 are grouped in 8 pairs with longitudinal muscles as the directive mesenteries, owing to the development of the mesenteries of the third order in the secondary endocœls, and the last 4 mesenteries are unpaired at the sides of the directive mesenteries. The arrangement of the 20 oldest mesenteries thus agrees completely with the corresponding condition in *Halcurias*. In the endocœls of the second order we find mesenteries of the third, fourth, and fifth order. The mesenteries of the third order (8 pairs) are perfect, and have longitudinal muscles typical of the Actiniaria (muscles facing inwards). The mesenteries of the fourth order are unequally developed. On one side of the mesenteries of the third order, between these and the mesenteries of the second order, there is an imperfect mesentery of the fourth order, but on the other side a pair, consisting of one imperfect mesentery, lying nearest the mesenteries of the third order, and a perfect mesentery. Between the latter and the mesentery of the first order there is an imperfect mesentery of the fifth order. The arrangement of the mesenteries is thus: $6-4-8-8+8$ unpaired -8 unpaired; thus in all 26 pairs, $+8$ unpaired of the fourth and 8 unpaired of the fifth order, or 68 mesenteries. While this is typical, the development probably proceeds somewhat further in some ways in very old specimens.

The mesenteries are somewhat thick, owing to the thickness of the mesoglœa. The longitudinal musculature is fairly well developed, though not so much as in *Halcurias*. In the distal part the folds are thick, but grade towards the proximal end to a weak, only a little condensed, pennon-like region (Plate, figs. 7, 8), which approaches the body-wall and fuses with the well-developed parietal parts of the longitudinal musculature. The parietobasilar musculature is narrow but fairly well developed (Plate, figs. 7, 8), and goes far out towards the distal end. There are no separate basilar muscles, though in the foot end the muscles pass in a transverse direction, also on the longitudinal muscles' side of the mesenteries; but these muscles which run transversely are continuations of the longitudinal musculature, which at the base of the column bend in a transverse direction (*cf.* p. 252, *Ilyanthopsis elegans*).

The filaments are well developed and extremely broad, owing to the strong development of the mesoglœa (Plate, fig. 9). The vacuolar streak is little differentiated. Both in the intermediate part of the ciliated tract region and in the nematocyst glandular streak there are sparse spirocysts and fairly numerous thick-walled nematocysts, especially in the latter (length 36–41, sometimes even 46 μ, and about 3 μ broad). Of fairly common occurrence further in the glandular streak are nematocysts with distinct basal part to the spiral thread (length 37–41 μ, breadth 7 μ). Even the entoderm of the filament is pigmented, especially on the region of the border-streak.

The sexual organs occur on all well-developed mesenteries, even on the directive mesenteries. The animals are diœcious.

For the *Porponia* obtained by the *Scotia* Expedition I have set up a new species, *P. antarctica*. Of the species of *Porponia* already known it comes nearest to *P. robusta*, R. Hertwig, both in the form of the body and the appearance of the tentacles. To set up good characters between these two species is, however, distinctly difficult, as Hertwig's description of *P. robusta* is so incomplete, and both, this species as well as the two specimens of *P. elongata*, do not seem to have the number of mesenteries and tentacles typical of *P. antarctica*. It is probable that the mesenteries of the fifth order have not been laid down in Hertwig's form, to judge from the number of tentacles, which Hertwig gives to be 54 in *P. elongata*. According to some notes made by me in 1897 on revising the *Challenger* Actiniæ, the distribution and size of the spirocysts and nematocysts in *P. robusta* and *P. elongata* were as follows:—

The spirocysts in the body-wall were in *P. robusta* very numerous and about 40–44 μ long, in the tentacles of *P. elongata* about 56–72 μ; there were also spirocysts in the œsophagus of these two species. The nematocysts in the œsophagus were 48 μ long in both *P. elongata* and *P. robusta*, in the tentacles of *P. elongata* 48 μ long. It is, however, noticeable that there were only fragments of the ectoderm in the *Challenger* species.

II. On the Systematic Position of the Genus Porponia.

According to the anatomical account of the genus *Porponia* given above, there should be no doubt remaining that *Porponia* and *Halcurias* (*Endocœlactis*) are very nearly related to each other. Common to both is the structure of the body-wall, and also of the œsophagus, both, among other things, being provided with numerous spirocysts. Even the anatomical structure of the filaments and distribution of the sexual organs show agreement. Most striking, however, is the characteristic and similar arrangement of the tentacles and mesenteries, which differs from that in all other known Actiniaria, as can be seen more clearly from the following scheme for the two genera. In both *Halcurias* and *Porponia* the same displacement of the original mesenteries and tentacles has clearly taken place. After the formation of the first 6 pairs of mesenteries, 1, 1, etc., in the ordinary way, 2 mesenteries (2, 2), with the longitudinal muscles faced outwards, have arisen in the lateral endocœls, and these mesenteries

form normal pairs with neighbouring mesenteries of the first order. At this stage, therefore, the genera have 10 pairs of mesenteries, 2 of which, lying medially opposite to each other, are directive mesenteries, whilst the other 8 are formed in pairs with typically arranged longitudinal muscles. In the 8 new endocœls arisen through the growth of the mesenteries of the second order, there is a further development of 8 normal pairs of the third order, so that at this stage we have 10 (6 + 4) + 8 = 18 pairs of mesenteries. Thereafter the development proceeds in a more normal manner, the mesenteries of the fourth and fifth order in *Porponia* not developing in the endocœls of the third order, but on both sides of a pair of the third order; in an exocœl in relation to the mesenteries of the third order, but in an original endocœl of the second order. I have endeavoured previously (1897) to show that the development proceeds in this way in *Endocœlactis*, as with fairly great certainty I considered it possible, partly from the unequal development of the mesenteries at the basis of the column, to distinguish the first 6 pairs of mesenteries (1, 1, etc.) from the 4 pairs of the second order, and thence from the obviously great development of these 10 pairs in comparison with the others to distinguish them clearly from the subsequent orders of mesenteries. In *Porponia* I had admittedly not been able to study the development of the mesenteries so clearly as *Endocœlactis*, as the difference between the mesenteries of the said orders were not so distinct as in this latter form, owing to the fact that in *Porponia* several more complete mesenteries occur than in *Endocœlactis*. The arrangement of tentacles in *Porponia*, as also the whole arrangement of mesenteries, indicates, however, that in this genus the mesenteries arise in the same manner, and that also after reaching a stage with 6 normally placed pairs of mesenteries, a development of mesenteries in the endocœls has taken place. The groups of tentacles of the first and second orders, which arise near the directive mesenteries 1, 2, 1 (dt.), 2, 1, and those which lie in the transverse plane 1, 2, 1, are inside the tentacles of the corresponding order which stand at the other 4 pairs of stronger mesenteries, a condition that is to some extent indicated on the schematic figure, but which in reality is considerably greater than the figure shows. This indicates that we have to arrange the first 6 pairs of mesenteries by this plane. With regard to the arrangement of the tentacles otherwise, this is in the main the same in the two genera, great displacements occurring in the cycles with the development of certain mesenteries in the endocœls, wherewith, so to speak, a doubling of the tentacles in the lateral endocœls of the first and second orders arises. Above all, the arrangement of the 28 innermost tentacles is the same in both genera, as the figure shows. It is characteristic of both genera, therefore, that all the mesenteries of the second and third orders develop in the endocœls, and that in consequence great displacements in the position of the tentacles take place.

Nevertheless, there are a number of differences in the structure of the two genera. In a number of less important characters, such as the form of the body—in *Porponia* beaker-like, in *Halcurias* more cylindric—in the presence of only one œsophageal groove in *Halcurias*, whilst *Porponia* has two, there are certainly differences between

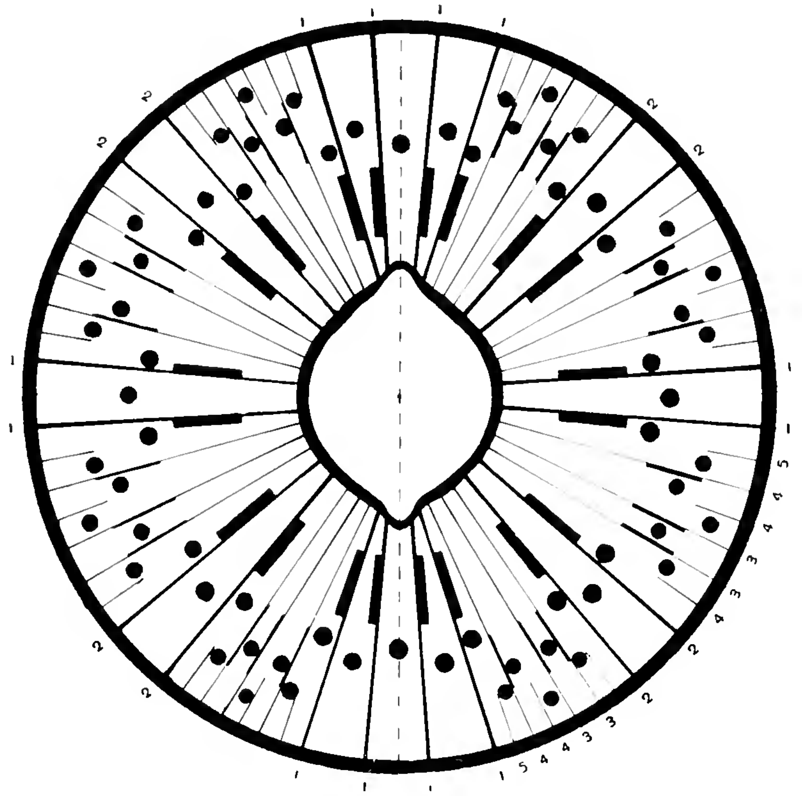

FIG. 2.

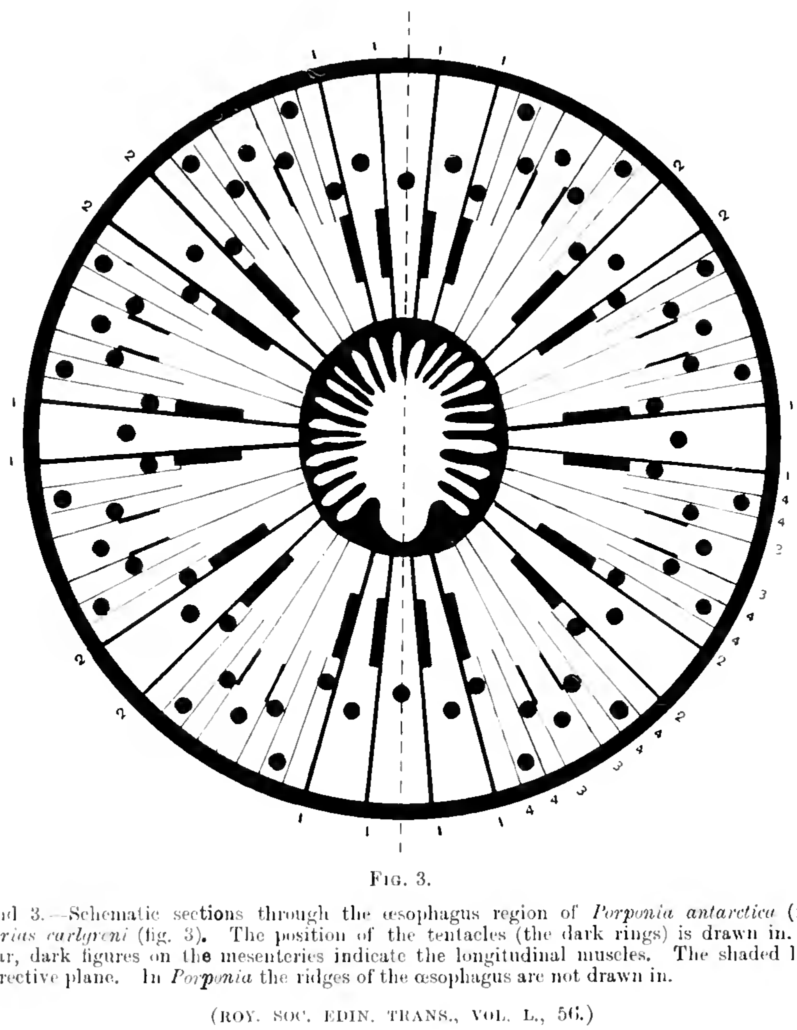

FIG. 3.

FIGS. 2 and 3.—Schematic sections through the œsophagus region of *Porponia antarctica* (fig. 2) and *Halcurias carlgreni* (fig. 3). The position of the tentacles (the dark rings) is drawn in. The rectangular, dark figures on the mesenteries indicate the longitudinal muscles. The shaded lines denote the directive plane. In *Porponia* the ridges of the œsophagus are not drawn in.

the genera, but also others more important exist. In the two genera the tentacles are formed in a different manner, having the usual appearance in *Halcurias*, whilst they are greatly thickened in *Porponia* on the outer side, so that it looks as if the thick mesoglœa of the body-wall extended in the form of bridge-like outshoots into the tentacles. An important distinction between *Porponia* and *Halcurias* is also seen in the development of the mesenteries. Whilst *Halcurias* has only 10 pairs of stronger mesenteries—the mesenteries of the third order being thus but feebly developed, and that only in the most distal end—there is a much larger number of stronger mesenteries in *Porponia*, which are connected with the œsophagus in its whole length or the greater part of this. Very characteristic also is the fact that the development of the mesenteries, which appear after the mesenteries of the third order, is different in the two genera. In *Halcurias* the mesenteries of the fourth order arise normally, so that the two mesenteries in the same pair appear simultaneously; the development then ceases, though it is possible that in some cases mesenteries of a fifth order may be laid down. In *Porponia*, on the other hand, the development has taken a different line, and comes to resemble that of the later mesenteries in *Actinostola* and *Stomphia*. The mesenteries of the fourth order, namely, do not appear at the same time; on the one hand, the one mesentery is developed much earlier than its pair; on the other, the development of the mesenteries of the fourth order is delayed in certain regularly arranged exocœls, so that here only one unpaired mesentery instead of a pair arises. This displacement of the mesenterial appearance has had the result that an unpaired mesentery of the fifth order arises on the side where the strongest and perfect mesentery of the fourth order lies. In fact, the development of the mesenteries of the fourth and following orders in *Porponia* comes under the same law as I have indicated for the development of later mesenteries in Actinostolidæ, and which means that the development of a stronger mesentery in a previous order leads to an earlier development of the mesenteries of the subsequent orders in the area which lies nearest this stronger mesentery. Finally, it has to be noted that irregularities not rarely arise in a quadrant of *Porponia* which shows a somewhat larger number of mesenteries than the normal. If we indicate the mesenteries with numbers, those of the first order with 1, of the second with 2, and so on, the irregularity in the arrangement of the mesenteries on each side of the directive plane can be seen from the following scheme for the two genera (dm. = directive mesenteries):—

Halcurias (*Endocœlactis*).

1 (dm.) 1, 4, 4, 3, 3, 4, 4, 2, 2, 4, 4, 3, 3, 4, 4, 1, 1, 4, 4, 3, 3, 4, 4, 2, 2, 4, 4, 3, 3, 4, 4, 1, 1 (dm.) = 34.

Porponia.

1 (dm.) 1, 5, 4, 4, 3, 3, 4, 2, 2, 4, 3, 3, 4, 4, 5, 1, 1, 5, 4, 4, 3, 3, 4, 2, 2, 4, 3, 3, 4, 4, 5, 1, 1 (dm.) = 34.

The arrangement of the tentacles is also somewhat different in the two genera (see figures). This difference is due entirely to the different arrangement of the mesenteries

of the later developmental stages, yet it has to be noted that the position of the tentacles, especially in *Porponia*, is difficult to determine, and it is just possible that the agreement is somewhat greater than is represented in the schematic figures.

While *Halcurias* and *Porponia* are thus closely related to each other, there is still the question whether they have any near relationship to the genus set up by R. HERTWIG, *Antheomorphe*, as M'MURRICH and HERTWIG maintain, the one for *Halcurias*, the other for *Porponia*. In my opinion, such a relationship does not exist, for *Antheomorphe*, according to HERTWIG's poor description of this genus, appears to have normally arranged mesenteries and tentacles. On the other hand, it is not impossible that *Halcurias* and *Porponia* are related to the form which WASSILIEFF (1908) has described as *Ilyanthopsis elegans*. The abnormal development of the mesenteries in *Ilyanthopsis elegans*, according to the obviously imperfect data given by WASSILIEFF, indicates, namely, the possibility of a mesenterial arrangement such as in *Halcurias* and *Porponia*, and even the habitus of the animal resembles that of *Halcurias*. To settle this, I have obtained a specimen of *Ilyanthopsis elegans* for investigation from the Conservator of the Bavarian State's collection in Munich. As WASSILIEFF's description of the animal leaves much to be desired,* and as it is by no means so schematically constructed as this author believed, I give here a description of this species, a description, however, that cannot be considered complete, as the material, which could not be dissected, was insufficient for the purpose.

The body in *Ilyanthopsis elegans* is elongated, cylindrical, the base distinctly flattened, but the boundary between body-wall and base not sharply marked. The body-wall is provided with irregular transverse and longitudinal furrows, so that the parts of the wall between the furrows have the appearance of raised areas, which, however, do not differ in their structure from the remaining part of the body-wall. The tentacles are of moderate length, 2–2·5 cm. (length of body over 6 cm.), and distinctly furrowed longitudinally, not thickened at the base and gradually narrowing towards the distal end. The arrangement of the tentacles was difficult to determine and by no means so simple as WASSILIEFF imagined. There is no arrangement into two circlets only; on the contrary, the arrangement shows distinctly a certain resemblance to that in *Halcurias* and *Porponia*, as some displacement of the tentacles has taken place, here also assuredly connected with an irregular arrangement of the mesenteries. In the first place, we have in each angle of the mouth (in the sagittal plane) quite the same arrangement of the tentacles as in *Porponia* and *Halcurias*. They further agree in this, that at certain points groups of tentacles occur, where two tentacles of the first order stand on each side of one of the second order. Lastly, the other tentacles also show a resemblance in arrangement to the corresponding tentacles in these genera.

* The Actiniaria described by WASSILIEFF, especially some of the species, require revision. Thus, the Actinia described by WASSILIEFF under the name of *Halcampella minuta* is quite certainly no *Halcampella*, but rather a *Haloclava*. The occurrence of warts and the appearance and structure of the tentacles, which are bulb-like and swollen at the tips, speak in favour of this. The arrangement of the mesenteries and the siphonoglyphe agree less definitely, but this may be due to the specimen being a young individual, as is indicated by the small number of tentacles (15). If it cannot be referred to *Haloclava* or *Eloactis*, it may represent the type of a new genus.

The arrangement, however, is difficult to determine in detail in *Ilyanthopsis*, as the grouping of the mesenteries is not known, and only one specimen has been at my disposal, which, moreover, showed an irregular grouping of the tentacles in certain parts. Starting from the one directive tentacle (that where the directive line passes through an œsophageal groove), the arrangement seems to be the following (1, 2, 3, etc., tentacles of the first, second, third, etc., order; dt. = the directive tentacle):—

1 (dt.)–2–1–5, 4–5–4–5–3–4–3–5–4–5–4–5–1–2–1–5–4–5–4–5–4–5–1–2–1–5–4–5–4–5–4–5–1–2–1–5–4–5–4–5–4–5–1–2–1– (dt.)–2–1–5–4–5–4–5–4–5–1–2–1–5–4–5–4–5–4–5–4–5–1–2–1–5–4–5–4–5–4–5–1–2–1–5–4–5–4–5–4–5–1–2.

It is to be noted here, that among the last mesenteries of the first order, nearest to the last mesentery of the first order, there may be a few tentacles more. A small part of the edge of the body, namely, had been torn away, and it is possible that some tentacles, at most 4 probably, have gone with it. In this specimen, therefore, the number of tentacles is somewhat higher, yet not so high as 100. The group 3, 4, 3, is also somewhat uncertain, in so far as it cannot be determined whether it is a 1, 2, 1 group or not; in any case it seems to stand somewhat inside the other groups of the first and second order. But to clear up the arrangement of the tentacles definitely requires an investigation of more material with the developmental forms.

The oral disc is somewhat broader than the base, with deep, radial furrows corresponding to the insertions of the mesenteries. The mouth was partly projecting, wide. The œsophagus is wide, long, almost half the length of the body, with a siphonoglyphe. Wassilieff states that two grooves are present, but I have not been able to find more than one; the other supposed to be present by Wassilieff does not differ—at least in the specimen examined by me, which has also been investigated by Wassilieff—from the deep longitudinal furrows with which the œsophagus is also provided. Including the siphonoglyphe, the number of these furrows amounts to about 16. No well-marked prolongation of the groove downwards below the œsophagus is present.

The anatomical structure resembles that of the Endocœlactidæ. The ectoderm of the body-wall is not extensive, especially by comparison with the thick mesoglœa. It contains very numerous spirocysts of varying size, and fairly numerous thick-walled nematocysts (length 34–43 μ, breadth 5 μ). In transverse sections at the base of the ectoderm we find structures packed close together, which greatly resemble cross-sections of ectodermal, longitudinal muscles. In the beginning also I was inclined to take them as such, but a closer examination showed that this was hardly the case. In longitudinal sections (Plate, fig. 2) I found similar structures, which should not have been there if it was a question of longitudinal muscles. The muscle-like parts are, indeed, so far as I could determine, no other than the greatly thickened bases of ectoderm cells, which can also be clearly seen when the section cuts through a wall of the ectoderm and passes through the ectoderm cells a little way from the base. In these it can be seen that the ectoderm cells are fixed in the mesoglœa by greatly thickened bases. I lay stress on this, as M'Murrich was of the opinion that in

Halcurias pilatus he had found longitudinal muscles in the ectoderm of the body-wall. Though I have not examined this species, I consider it possible that the same condition prevails there as in *Ilyanthopsis*—in other words, that the longitudinal muscles are no other than thickened, basal parts of the ectoderm cells. The mesoglœa of the body-wall is very thick, and provided with extremely numerous cells with bipolar, irregularly prolonged ends. In the inmost part of the mesoglœa there are closely packed fibrillar folds arranged as Plate, fig. 1, shows. The sphincter I have not closely examined, but I think it probable, from an external investigation, that this is completely wanting, as WASSILIEFF states. The entoderm is somewhat broader than the ectoderm, and thicker in the middle between the insertions of the mesenteries than at the sides. WASSILIEFF has described the structure of the tentacles and emphasised the longitudinal muscles of the ectoderm. The ectoderm contains very numerous spirocysts of varying size, and also numerous thick-walled nematocysts (length about 36 μ). The longitudinal musculature of the ectoderm is comparatively weak. How far fine outshoots run out from the mesoglœa into the ectoderm, as is stated by WASSILIEFF, I am unable to determine; it seems to me that these outshoots are nothing else but the thread-like basal parts of the ectoderm cells. The ectodermal nematocysts and spirocysts of the oral disc agree with those in the tentacles, but are not so abundant. The ganglion and nerve layer is also well developed here, as in the tentacles. The ectodermal radial musculature is strong, especially in the ridges, and the muscle folds just as high as, or higher than, the epithelial parts of the ectoderm. The inner parts of the muscle folds show a tendency to be mesoglœal in the ridges (Plate, fig. 3). The structure of the œsophagus agrees with that of the body-wall. The mesenteries are all complete, corresponding in number to the tentacles.

As WASSILIEFF states, the musculature is very weak, and only somewhat more strongly developed where the mesenteries join the body-wall (Plate, fig. 1). Here we can distinctly distinguish the muscles, both the longitudinal and the parieto-basilar, which are weak. On the very thin mesenteries there is no trace of protuberance of the longitudinal muscles. In longitudinal sections through the mesenteries and transverse sections through the base it looks as if the basilar muscle occurred as a weak fold of the musculature of the mesenteries. But specially differentiated basilar muscles do not seem to be developed, for the transverse layer of muscles near the base on the side of the mesenteries where the longitudinal muscles are, is formed by the latter muscles, bending almost at a right angle a little way from the base, thus forming what may be called pseudo-basilar muscles (Plate, fig. 7), the same condition as in *Porponia*, as I was able to determine from preparations of the mesentery. With regard to the arrangement of the mesenteries, it is impossible to determine whether all of them are equally developed. So much can be said, however, that in the specimen I have examined, in addition to the directive mesenteries with longitudinal muscles on the outer side, the other mesenteries seem to be arranged in pairs with the longitudinal muscles on the inner side. The *Halcurias* stage, or rather

the *Porponia* stage, which *Ilyanthopsis* probably passes through during development, is thus not apparent in the older individuals. The filaments seem to agree with those in *Halcurias* and *Porponia*, but were so badly preserved that I could not obtain any clear picture of them. In addition to spirocysts there are thick-walled nematocysts like those in the body-wall (length 36 μ), as also numerous thick-walled capsules with distinct base to the spiral thread (length 31–34 μ, greatest breadth 5 μ). Sexual organs are present on all the mesenteries. The animal is hermaphrodite. Well-developed testes occurred distally inside the filament region in each mesentery, while a few grape-like eggs were found in the proximal part.

The investigation of *Ilyanthopsis elegans* has thus led to the result I imagined it would, namely, that this is nearly related to *Halcurias* and *Porponia*. Though the material is too small to permit of a detailed statement of the grouping of the tentacles and mesenteries, there can be no doubt that they should be placed together. The arrangement of the tentacles shows the same characteristics as in these genera, and certain features of the mesenterial arrangement are the same apparently. Even the external appearance agrees well with that of *Halcurias*: spirocysts occur in the body-wall and œsophagus, as in the latter genus and *Porponia*. *Ilyanthopsis* shows most resemblance to *Halcurias*, and it might be a question whether these two genera should not be joined as one. For the time being, however, such a grouping would not be so fortunate, as *Ilyanthopsis* has a much greater number of mesenteries than *Halcurias*; further, in the former all the mesenteries are perfect, while in the latter about half are perfect. Add to this that the longitudinal musculature of the mesenteries is strongly developed in *Halcurias*, very weak in *Ilyanthopsis*, and it is evident that *Ilyanthopsis* has its own developmental characteristics. It seems, moreover, more probable that *Ilyanthopsis* has passed through a *Porponia* stage than a *Halcurias* stage, if the mesenteries are taken into consideration. If we imagine all the mesenteries in *Porponia* to be perfect, it is quite easy from them to derive the arrangement of the mesenteries in *Ilyanthopsis*. In *Halcurias*, on the other hand, the stronger, not-directive mesenteries occur as unpaired mesenteries. How the development has proceeded we can only learn from the younger stages. I consider it advisable, therefore, to set up a new genus, *Synhalcurias*, for the species *Ilyanthopsis elegans*. The genus *Ilyanthopsis* must be abolished, as the type species of this genus, *Ilyanthopsis longifilis*, R. Hertwig, is no other than *Condylactis passiflora*, as stated by PAX (1910); I had also come to this view in 1897 on examination of type specimens of the *Challenger* Actiniæ in London.

We know of one more genus that might possibly be allied to *Porponia*, namely, the genus *Actinernus*, founded by VERRILL. From R. HERTWIG's description of *Polysiphonia tuberosa* (= *Actinernus tuberosus* M'Murrich) and from M'MURRICH's description of *A. plebeius*, however, we can hardly conclude that a close relationship exists between *Porponia* and these forms. According to my observations on a specimen of *Polysiphonia tuberosa* from the *Challenger* Expedition, the arrangement

of the tentacles does not seem to show the displacement seen in *Porponia*; in fact, as far as I can see, the tentacles are at no places grouped in such a way that two tentacles of the first order border on a tentacle of the second order, even though certain changes in the size of the tentacles have been observed, so that according to R. HERTWIG the exocœl-tentacles are not the smallest in size. Though *Actinernus plebeius* and *A. tuberosus* do not suggest any close relationship to *Porponia*, it is yet not impossible that the type specimen of the *Actinernus* genus may show greater similarities, a question I may leave unsettled at present, as I have not had the opportunity to examine this specimen.*

For the present, therefore, we must be content with a comparison between *Halcurias*, *Porponia*, and *Synhalcurias*. The question is now, where we are to place these genera, and would it be of advantage to separate them from other forms? M'MURRICH in 1901 dealt with this question with regard to the genus *Halcurias*. "There are, apparently, three courses open for the disposal of the genus. It may be referred to a family already existent, the definition of the family being changed, if necessary, to accommodate it, or it may be taken as the type of a distinct family, as CARLGREN has done, or, finally, it may be separated altogether from the Hexactiniæ and regarded as the type of a separate tribe. It seems to me that this last procedure is quite unnecessary and would probably be entirely out of harmony with the phylogenetic relationship of the genus. We have learned within recent years how extensively nearly allied forms may differ, and how great all the modification which the hexactinian type may undergo. The entire facies of *Halcurias* is that of an hexactinian." I am entirely in agreement with the above citation from M'MURRICH, and, like this author, I am of opinion that it is unnecessary to set up a separate tribe for this genus and *Porponia*, as the whole development indicates that the initial stage is a typical hexactinian with six pairs of mesenteries. M'MURRICH comes further to the conclusion that *Halcurias* need not be placed either in a separate family, as I had done in 1897, but considers it preferable to refer the genus to the family Actinidæ (Antheadæ). "The peculiar mode of development of the secondary and tertiary mesenteries is of minor importance, and I see no more reason for separating *Halcurias* as the type of a new family than I do for separating an octamerous sagartian or one with a multiplicity of mouths and many siphonoglyphs from the rest of the members of that family." He supports this view because "occasional endocœlous development of mesenteries have been already recorded, as in *Bunodes thallia*, in *Actinioides dixoniana* and *papuensis*"—a condition already pointed out by me in 1897.

But is this view of M'MURRICH justifiable? So far as I can understand, this is not the case, as variations irregularly arisen through asexual propagation, or through regeneration and regulation in the symmetry of certain species—in the case of the phylogeny—cannot directly be compared with similar variations from the normal type arising during the ontogeny—a condition not hitherto taken into consideration, but

* Compare Appendix I

which I must strongly emphasise. A species, for example, that normally, through unequal development of mesenteries, through stopping of the growth of certain parts and more rapid growth of others during the ontogenic development, *e.g.* from being a 6-rayed becomes an 8- or 10-rayed type, which is constant or nearly so for the species, cannot in phylogenetic respects be compared with another species where the same stages are obtained through accidental, asexual propagation or by regeneration. In the first case, the 8- or 10-rayed type is constant for the species, and occurs ontogenetically and phylogenetically; in the latter case, on the other hand, it is a mode of adaptation in a less or greater part of the individual, and is dependent on the course of the asexual propagation, and the greater or less reduction of the old mesenteries in the separated or damaged fragments, a condition which has been further dealt with in my studies on the regeneration and regulation stages in the Actiniæ, 1904, 1909. In so far as it has arisen ontogenetically, an 8- or 10-mesentery stage is thus of direct use for the phylogeny, but not in other cases. What applies to the occurrence of an 8- or 10-rayed type of Actiniaria also applies to the varieties that arise through the development of the mesenteries in the endocœls. In such cases the conditions are in full agreement with those found in 8- or 10-rayed forms. *Porponia* and *Halcurias* leave no doubt that the regular development of mesenteries in the endocœls has taken place ontogenetically, whereas the irregular and chance development of mesenteries in the endocœls in *Bunodes*, *Actinioides*, and others stands in intimate connection with the regeneration or possible early dislocations of tissues during development. In *Porponia* and *Halcurias* the development of mesenteries in the endocœls is of importance for the classification, whereas the abnormal occurrence of mesenteries in the endocœls in *Bunodes*, etc., is of no use for this purpose.

The peculiarity that mesenteries occur regularly in the endocœls during the course of development is thus quite specific for *Porponia* and *Halcurias*, and probably also for *Synhalcurias*, and has not been observed in other Actiniaria. The question is still left open, if this peculiarity is of such great importance that it necessitates the setting up of a separate family. As mentioned above, M'Murrich connects the development of mesenteries in the endocœls with the occurrence of an 8-rayed type, with the development of several mouths and several siphonoglyphs. Just as little as we separate the forms showing such variations from the normal Actiniaria type ought we, in his opinion, to separate *Halcurias* from allied forms on account of the development of mesenteries in the endocœls. That the multiplication of mouths in a genus of Actiniaria does not involve a separation of the genus in question from other closely related species is evident from the above, as this multiplication has not arisen ontogenetically, but by asexual propagation. The same is certainly also the case with the multiplication of the siphonoglyphs. It is now left to take into consideration the abnormal development of the mesenteries. An 8- or 10-rayed type derived ontogenetically from a 6-rayed one is, as already known, by no means a seldom occurrence within the Actiniaria group, and may obviously arise within different families and genera that are in no genetic connec-

tion with each other. M'MURRICH is therefore quite right in saying that a genus or species need not be separated from other genera or species because it has been transformed into an 8- or 10-rayed type. It must be pointed out, however, that such a type may in certain cases be of great importance for the classification, namely, in cases where 8 or 10 rays are observed in all species of a certain genus, as the variation in the symmetry can naturally be used as a good generic character. We know of no case where a number of the pairs of mesenteries differing from 6 has led to the setting up of a separate family.

As shown above, both *Porponia* and *Halcurias*, from an assumed typical 6-paired mesentery stage, are transformed into one having 10 pairs of mesenteries. Where the transformation takes place in the ordinary manner by the belated appearance of certain mesenteries in certain areas and through the arising of other mesenteries in the exocœls,* it seems unnecessary to separate these genera, but as the 10-rayed condition arises in such a specific way by development of mesenteries in the endocœls, a development that is continued during the following cycle, I consider it absolutely necessary to set up a separate family for these genera, the more so as such an ontogenetic development of mesenteries in the endocœls has not been observed in any other Actiniaria of a higher type. As far as we know, no such displacement of the tentacles has been observed in other forms of Actiniaria than the above mentioned. I place *Porponia* and *Halcurias* together in one family, therefore, to which already in 1897 I gave the appropriate name of Endocœlactidæ.

III. RELATIONSHIP OF THE FAMILY ENDOCŒLACTIDÆ TO OTHER ACTINIARIA—ORIGIN OF THE RUGOSA TYPE.

As already mentioned in the introduction, R. HERTWIG stated the possibility that *Porponia*, owing to the arrangement of the macro- and micro-mesenteries, might form a transitional stage between the Hexactiniaria (Actiniaria) and Zoanthidæ (Zoantharia). This explanation of the position of *Porponia* and the family Endocœlactidæ cannot, of course, be maintained, after we have ascertained the facts on which the relationship between stronger and weaker mesenteries depends. There is nothing in the organisation of the family Endocœlactidæ that might indicate a close relation to the Zoanthidæ, as the development of the mesenteries in this family takes place in quite a different way from that in the latter characteristic group of Anthozoa.

In my paper on *Endocœlactis* (=*Halcurias*) I pointed out that in *Minyas* there is a strong tendency to widen the endocœls at the expense of the exocœls, causing an alteration in the grouping of the mesenteries, which had some resemblance to the alteration in the grouping of the 10 stronger mesenteries in *Endocœlactis*. How this grouping of the mesenteries has taken place in *Minyas* is still unknown, but it may possibly have arisen in connection with the development of mesenteries in the endocœls,

* It is also to be noted that not all 8- or 10-rayed types are homologous with each other, for the 8- or 10-rayed condition is not always obtained in the same way ontogenetically.

though this is not absolutely necessary. The arrangement of mesenteries in *Minyas* may be explained quite simply through an enlargement of the endocœls. In any case I consider the similarity in the *Endocœlactis* and *Minyas* arrangement as due to convergence, a view which I am now able to further confirm, as *Minyas*, *i.e.* the species described by me in 1895, and a closely related species, probably *M. olivacea*, later examined by me, are stichodactyline Actiniaria, which are nearly allied to the family Aurelianidæ (the genera *Aureliana* and *Actinoporus*).

With regard to the position of the family Endocœlactidæ, I pointed out in 1897 that it must be placed fairly low in the system of Actiniaria, a view that has also been taken up by M'Murrich. This is indicated not only by the absence of the sphincter and the presence of spirocysts (thin-walled nematocysts) in the ectoderm of the body-wall and œsophagus, but also by the absence of true differentiated basilar muscles. Thus, the Endocœlactids must be Actiniaria, though they are not developed in the same way as the elongated genera provided with physa (*e.g.* Edwardsidæ, Halcampidæ). From a theoretical point of view we must assume the occurrence of forms which constitute a link between the Protactininæ and the Athenaria among the Actininæ, *i.e.* we must take for granted the occurrence of original Actiniaria, which by the retention of the original body-shape with flat base (thus without development of a physa) have lost the longitudinal muscles in the body-wall, but, on the other hand, have not yet developed true basilar muscles; in the same way as I pointed out (1900, p. 57) that the family Discosomidæ forms a link between the Protostichodactylinæ and Stichodactylinæ. Among the Actininæ type similar conditions would then prevail with regard to the family Endocœlactis, if my supposition that this family has no longitudinal muscles in the body-wall proves to be correct. Should it be the case, on the other hand, that M'Murrich is right in saying that such longitudinal muscles occur in *Halcurias pilotus*, the family Endocœlactidæ must be referred to the Protactininæ. In this case the thickenings of the basal parts of the ectodermal cells in the body-wall may be considered as rudimentary epithelial muscles, a view, however, I do not hold, and a question that can only be answered by means of good material of maceration. For practical reasons it would possibly be advisable in future to combine the family Endocœlactidæ with the Protactininæ, and the Discosomidæ with the Protostichodactylinæ, a grouping which I already, in 1900, p. 57 (77), pointed out as possible with regard to the Discosomidæ.

In my opinion, the family Endocœlactidæ must thus belong to the lowest Actininæ, or possibly to the more differentiated Protactininæ. Probably an intimate relation to any other Actininæ family does not exist.

Before concluding the account of the relations of the family Endocœlactidæ to other Actiniaria, we might just point out that these variations are of importance for the study of the other Anthozoa. As already known, the skeleton-forming Madreporaria show similar variations from the usual symmetry, as the Actiniaria, as 8- and 10-rayed, radial or more bilateral forms are found even there. As we have seen that such a

peculiar symmetry as that in Endocœlactidæ may also be found in the free Actiniaria, it seems reasonable to conclude that among the variously attached Madreporaria, with their varying adaptation to the under-layer, still more complicated and varying arrangement of the mesenteries may be found. In my opinion, the arrangement of the mesenteries in Endocœlactidæ opens up the possibility of a more intimate connection between Rugosa and Madreporaria, and more readily leads to an explanation of the conditions of symmetry in Rugosa, like the one proposed by me in BRONN's *Klassen und Ordnungen*, p. 150. Whilst the development of the mesenteries in the Endocœlactidæ gives a greater possibility of interpreting Rugosa, it makes the question still more complicated, as in Rugosa there might be a development of mesenteries in the endocœls. Though we shall naturally never be able to reach finality with regard to the position of Rugosa as compared with the typical Madreporaria, but have to be satisfied with a hypothetical explanation, so long as we do not know how the mesenterial musculature is arranged, I shall nevertheless give a picture of the way in which we might imagine the origin of the Rugosa type, if the mesenteries after the 6-pair stage have developed in the endocœls. I presuppose that the hypothetical, separating walls, sarcosepta, are taken as mesenteries, the skeletal dissepiments, sclerosepta, as septa.

We start, therefore, from a stage with 6 pairs of mesenteries arranged typically, but with the lateral endocœls larger or at least as large as the exocœls. In each of the 6 endocœls a septum has been formed (text-fig. 4A). In the next stage the development of mesenteries of the second order takes place in the same way as in the Endocœlactidæ, *i.e.* in the lateral endocœls, 4 pairs of the second order with the longitudinal muscles turned outwards. Each of these mesenteries of the second order forms a new pair with neighbouring mesenteries of the first order. In these new endocœls 4 septa are formed (text-fig. 4B).

Owing to this arrangement of the mesenteries and their occurrence only in the lateral endocœls, 4 zones of development have arisen instead of the 6 found in the exocœls of a normal Madreporaria. These zones of development lie one in each quadrant of the animal. This results in an asymmetrical development of the mesenteries, together with an irregular growth of the walls, due to the fact that the animal is generally attached along the one side of the goblet, or at least has been so once. The consequence is now that in each quadrant of the dorsal side of the animal, *i.e.* the side turned away from the siphonoglyphe, a complete suppression of the mesenteries of the next order takes place, while the development in the ventral part is continued. In the ventral endocœls 4 pairs of mesenteries arise with the same arrangement of the musculature as those of the second order. These mesenteries form new pairs with adjacent mesenteries of the first and second order. In the 4 new endocœls 4 septa are formed (text-fig. 4C). The development is continued in this way with the next order, with suppression of the mesenteries and septa in the dorsal endocœls of the third order in each quadrant. At the end of the development, or at least at a late stage, septa develop in the exocœls (text-fig. 4D).

As we see, the development of the Rugosa type may be explained by a similar development of the mesenteries as in *Halcurias* or *Porponia*, though with the

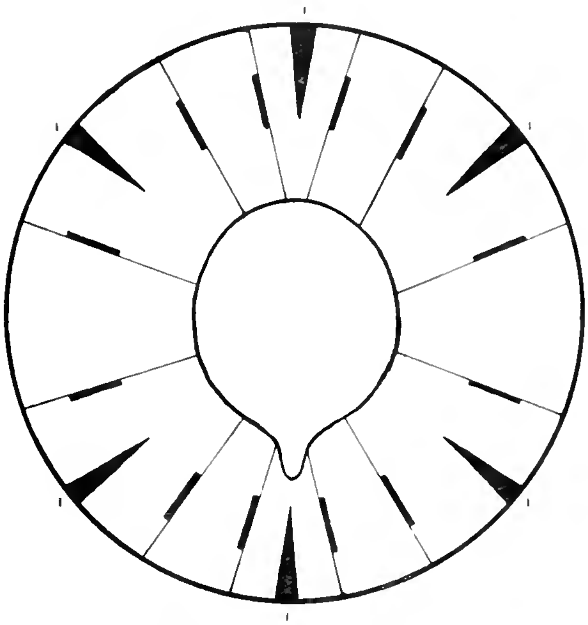

FIG. 4A.

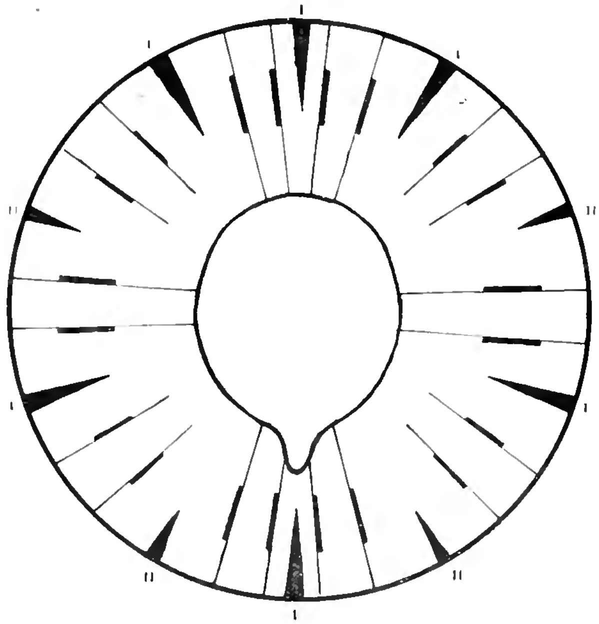

FIG. 4B.

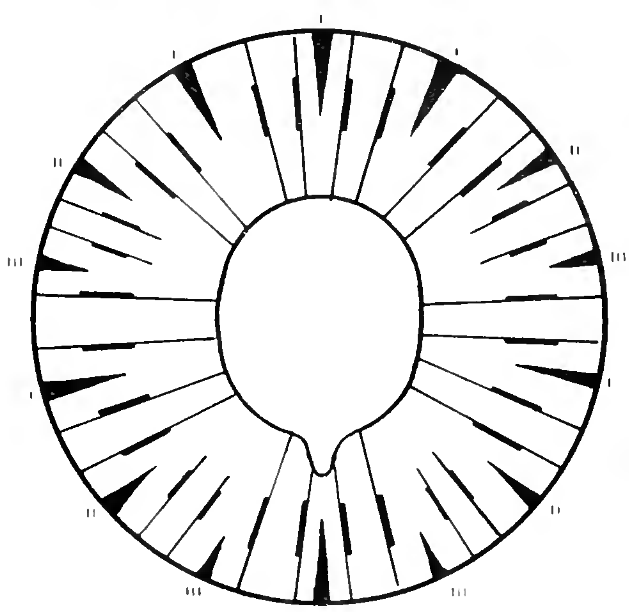

FIG. 4C.

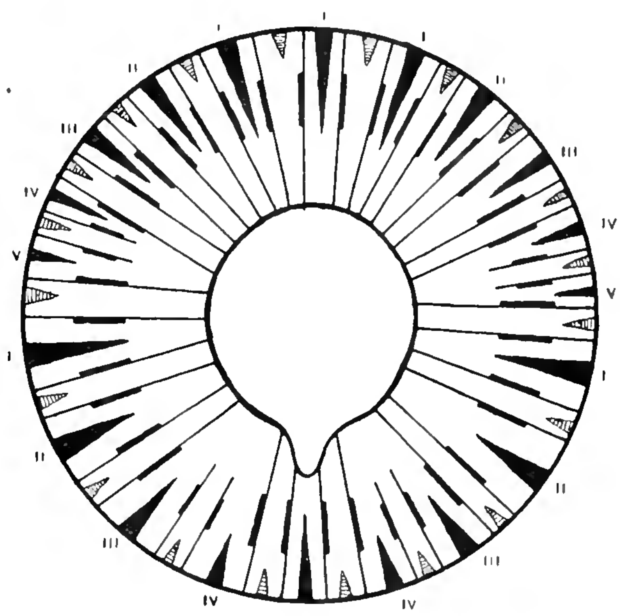

FIG. 4D.

FIGS. 4A–D.—Scheme to illustrate the origin of Rugosa, assuming that the development of the mesenteries to begin with has proceeded as in the Endocœlactidæ. The black tongues are endocœlic septa, the shaded tongues exocœlic septa.

difference that the development of new mesenteries is continued in the endocœls, and that in each quadrant a suppression of mesenteries on the dorsal side takes place in each

order from and with the third, a suppression which probably stands in connection with the animal's mode of life.

In this hypothetical explanation of the arrangement of the Rugosa septa, I have mainly intended to direct attention of palæontologists to the fact that the Rugosa type may be explained in various ways; moreover, a closer examination of Rugosa has shown that the development is different in different genera, that some of them retain a bilateral and others a more radial arrangement; the development of septa in this group, however, requires further examination.

The hypothesis put forward by me with regard to the origin of Rugosa seems to me to speak for itself. The presence of the 4 growth-zones after the development of the first 12 mesenteries in Rugosa may be fully explained by supposing a development of certain mesenteries like those in the Endocœlactidæ. The enlargement of the 4 primary lateral endocœls has led to developmental zones for the new mesenteries being removed to these areas instead of to the 6 primary exocœls. The origin of a 4 (8)-rayed type in certain Rugosa may be explained in this way. In any case, I consider the above explanation as good as, if not better than, that put forward by DUERDEN, to the effect that Rugosa must stand in a certain relation to the Zoantharia (Zoanthidæ). In consequence of this view, he also considers the latter group as very old, a view, however, I have some difficulty in accepting, as the Zoanthidæ are obviously rich in species, and presumably form a group which is still in process of differentiation. See also my work in BRONN.

Finally, it seems convenient further to characterise the family Endocœlactidæ with the genera *Halcurias*, *Porponia*, and *Synhalcurias*.

Family *Endocœlactidæ*.

Athenaria (Protactininæ?) with thick, sometimes cartilaginous body-wall, without sphincter and fossa, with spirocysts in the ectoderm of the body-wall and œsophagus. Arrangement of the mesenteries quite different from that of the normal Actiniaria type, owing to the development of the second and third order of mesenteries in the endocœls. In consequence, the arrangement of the tentacles very different from the normal type (among others, 10 tentacles of the first order immediately border on those of the second order). Sexual organs present on all the stronger mesenteries from and with those of the first order, including directive mesenteries.

Genus *Halcurias* M'Murrich = *Endocœlactis* Carlgren.

Endocœlactidæ with *ca.* 68 mesenteries, 36 of which are perfect. Four cycles of mesenteries. The mesenteries of the fourth order regularly arranged on each side of those of the third order, the mesenteries of the same pair equally developed. The perfect mesenteries arranged as follows: 20 (6 + 4 pairs) + 16 (8 pairs), of which the first 20 strong, extending over the whole length of the body; the others only developed in the distal part, and weak. The body cylindrical. The tentacles not bridge-like

thickened on the outer side. On the first 20 mesenteries the pennons of the longitudinal muscles well developed. One œsophageal groove.

H. pilatus M'Murrich.
H. carlgreni * M'Murrich (*Endocœlactis* sp. Carlg.).

Genus *Porponia* R. Hertwig.

Endocœlactidæ with (54 ? to) *ca.* 68 mesenteries, of which 44 perfect. Five cycles of mesenteries. The mesenteries of the fourth and fifth order are regularly arranged, but show unequal development, so that the mesenteries of the fourth order on the one side of the mesenteries of the third order consist of a perfect and an imperfect mesentery, on the other side only of an imperfect mesentery; but the mesenteries of the fifth order are not paired, and only developed between the mesenteries of the first order and the perfect mesenteries of the fourth order (as in Actinostola). The arrangement of the perfect mesenteries is 20 (6 + 4 pairs) + 16 (8 pairs) + 8 (these form pairs with imperfect mesenteries). The body goblet-like, sometimes cylindrical. The tentacles on the outer side bridge-like and greatly thickened. The pennons of the longitudinal musculature on the mesenteries hardly indicated. Two œsophageal grooves.

P. elongata R. Hertwig.
P. robusta R. Hertwig.
P. antarctica Carlgren.

Genus *Synhalcurias* Carlgren.

Endocœlactidæ with considerably more than 68 mesenteries (*ca.* 100), all of which are perfect, arranged in pairs, and frequently agreeing in the size and distribution of the sexual organs. The irregular arrangement of the mesenteries probably due to the development of the mesenteries of the second and third order in the endocœls. Origin of the mesenteries of the fourth order and the following (?). The body cylindrical. The tentacles are not thickened on the outer side. The longitudinal muscles of the mesenteries weak, not forming pennons, and almost equally developed on all mesenteries. One œsophageal groove (2 ?).

S. elegans (Wassilieff).

In a coming work I intend to give a description of the other Actiniaria, *ca.* 20 in number, which have been collected by the *Scotia* Expedition.

* As further characterisation of this species, I may give the following information about the nematocysts :—Spirocysts occur in quantities, especially in the tentacles, but are also common in the body-wall, the ectoderm of the œsophagus and in the filaments. They are of greatly varying sizes, generally as large as the corresponding thick-walled nematocyst capsules; but smaller as well as still larger ones occur, the latter especially in the tentacles, where they reach a length of up to 43 μ, breadth 7 μ. In the body-wall the thick-walled nematocysts reach a length of 22–26 μ, in the tentacles 26–34 μ, and in the filament and œsophagus *ca.* 26–29 μ. In the latter places are also found nematocysts with distinct basal part to the spiral thread, of almost the same length as the preceding, but broader at the basal end. The thick-walled nematocysts are most numerous in the tentacles.

APPENDIX.

Now that I have had occasion to examine two highly retracted and badly preserved specimens of the type of *Actinernus*, *A. nobilis* Verr. (place of discovery 43° 18′ N., 60° 24′ W., Gloucester Fisheries, 1879, U.S. Fish. Com.), as far as I can see from the bad material, the tentacles of the first and second order are arranged as in *Porponia*. There are also spirocysts in the ectoderm of the body-wall. Therefore I think that *Actinernus nobilis* (but not *Polysiphonia tuberosa*, and probably not *A. plebeius*—I have not seen this latter species) must be placed in the Endocœlactidæ. Whether *Porponia* and *Actinernus* are synonyms I cannot say for the present, but it is not impossible.

. *February* 4, 1914.

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EXPLANATION OF PLATE.

bac., thickenings of the basal part of the ectoderm cells?
cm., circular muscles.
ct., ciliated tract of the filament.
dp., directive plane.
ec., ectoderm.
en., entoderm.
lm., longitudinal muscles.
m. mesoglœa.
mf., fibrillous folds of the mesoglœa.

mp., muscles' pennon.
nd., cnido-glandular tract of the filament.
pbm., parieto-basilar muscles.
pm., parietal part of the longitudinal muscles.
psb., pseudo-basilar muscles.
rm., radiated muscles of the disc.
sp., spirocysts.
t., tentacles.

Figs. 1–4, *Synhalcurias elegans*; 5–9, *Porponia antarctica*; 10. *Halcurias carlgreni.*

Fig. 1. Transverse section through the body-wall with a part of two mesenteries. $\frac{4}{0}$.*

Fig. 2. Vertical section through the body-wall. Only a part of the mesoglœa is designed. $\frac{4}{3}$ with outdrawn tube.

Fig. 3. Transverse section of the mesoglœa and muscles of the disc. $\frac{2}{3}$.

Fig. 4. The basal part of a mesenterium with the longitudinal muscles and the pseudo-basilar muscles. Schematic.

Fig. 5. Cross-section through one tentacle above the middle. $\frac{4}{0}$.

Fig. 6. Cross-section through the same on the basis $\frac{2}{0}$.

Fig. 7. Cross-section through a not-directive mesenterium. The same section as in fig. 8. The whole breadth of the mesoglœa is not drawn. $\frac{2}{3}$.

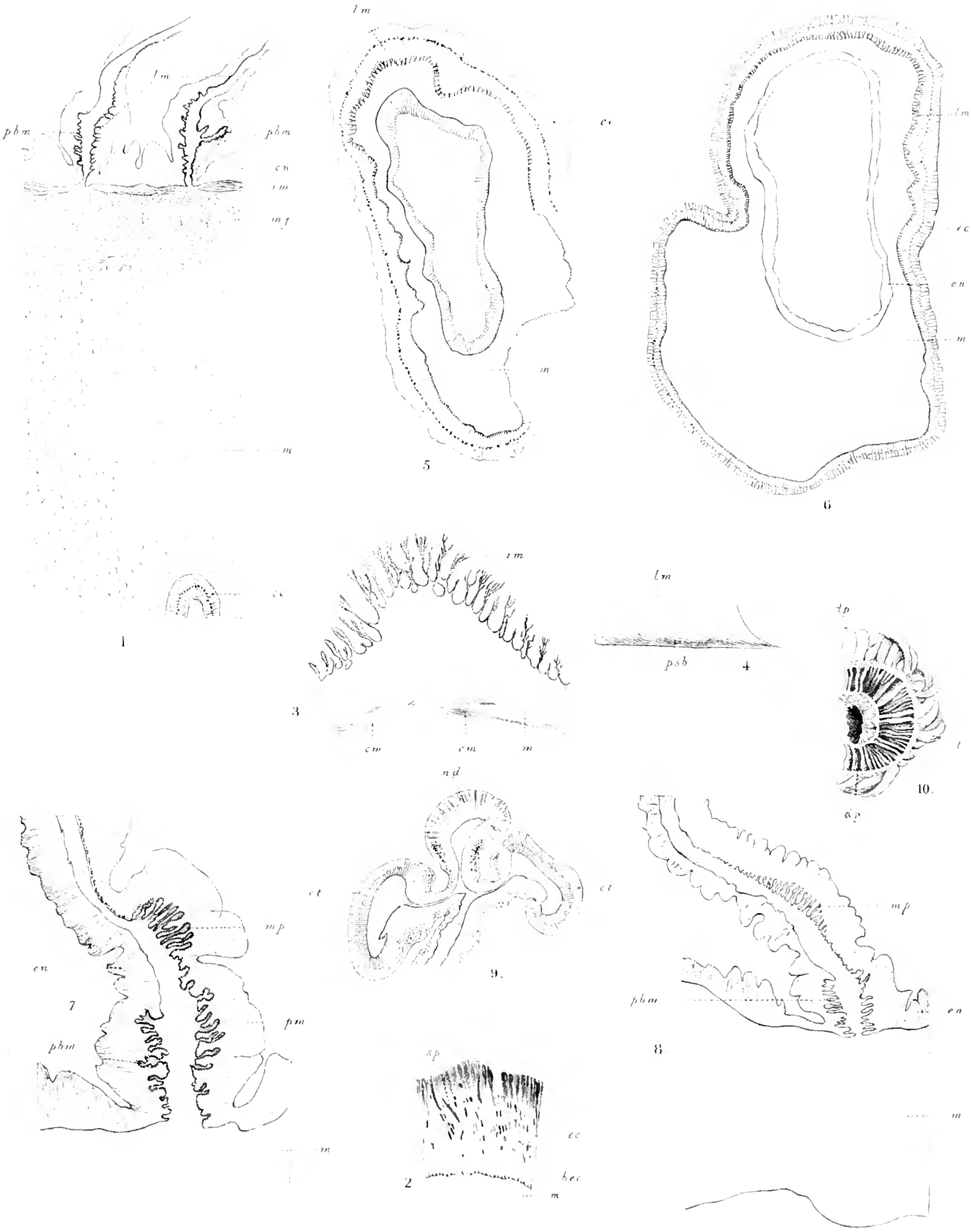
Fig. 8. Cross-section through a part of a directive mesenterium and the body-wall in the region of the aboral end of the stomatodæum. $\frac{4}{0}$.

Fig. 9. Transverse section of the ciliated tract region of the filament. $\frac{4}{0}$.

Fig. 10. Section through the upper part of the body to show the arrangement of the mesenteries. Twice magnified.

* Magnifications refer to Reichert's system, "Austria." Figures drawn in the level of the microscope's foot.

Carlgren: "Scotia" Genus Porponia.



Oskar Carlgren, del.

M. Farlane & Erskine, Lith. Edin.

PART XI.

NUDIBRANCH MOLLUSCA.

(BATHYDORIS.)

XI.—ANATOMY OF BATHYDORIS BROWNII, AND AFFINITIES OF THE GENUS: SCOTTISH NATIONAL ANTARCTIC EXPEDITION.

By T. J. EVANS, M.A. (Oxon.),
Lecturer in Zoology in the University of Sheffield.

(*WITH TWO PLATES.*)

XI.—The Anatomy of a New Species of *Bathydoris*, and the Affinities of the Genus: Scottish National Antarctic Expedition. By T. J. Evans, M.A. (Oxon.), Lecturer in Zoology in the University of Sheffield. *Communicated by* Dr J. H. Ashworth. (With Two Plates.)

(MS. received October 3, 1913. Read January 19, 1914. Issued separately April 1, 1914.)

Introductory.

The genus *Bathydoris* was created by Bergh in 1884 in his Report on the Nudibranch Mollusca collected by the *Challenger*. In his account of the anatomy of the new genus Bergh draws attention to the anomalous combination of characters possessed by the animal, and gives it an annectent position between the Dorids and the Tritonids, but places it among the Dorids on account of the predominance of Dorid features. The single specimen of *Bathydoris abyssorum* was dredged off New South Wales in 2425 fathoms. A second specimen of this peculiar genus was obtained by the Danish *Ingolf* Expedition and described by Bergh in 1900. This specimen came from 1870 fathoms in Davis Strait, and resembled *B. abyssorum*, with specific variations. Thus *Bathydoris* came to be regarded as an isolated genus with the characters of a connecting link, and appropriately a denizen of deep water. Our anatomical knowledge of the animal is derived almost entirely from Bergh's accounts of the two species mentioned, and is moderately extensive, considering the rather imperfect state of preservation of the material and the fact that he was dependent on single specimens in each case.

Two more specimens were brought from the Antarctic by the *Discovery* and described by Sir Charles Eliot in the *Report of the National Antarctic Expedition* published by the Natural History Museum in 1907. These constituted separate species resembling Bergh's, but their state of preservation was such that Eliot was able to add little to our knowledge of the anatomy of *Bathydoris*. The discovery of one of Eliot's species in 100 fathoms dispels the idea that the genus is confined to the great depths.

A specifically distinct specimen was also taken by the German Antarctic Expedition, but Thiele, in the Report on the Mollusca recently published, confines himself to a superficial description in order to retain the rare animal intact as a museum specimen.

It would seem to be the fate of polar expeditions to bring back single specific specimens of this genus; for the species which forms the subject of the present memoir is based on one specimen dredged in 1410 fathoms by the *Scotia* in March 1904. When the zoological material of the Scottish National Antarctic Expedition

was distributed for identification, the animal went astray, and Sir Charles Eliot, who received the Nudibranchs, comments with surprise on the complete absence of Dorids.

Dr Bruce has provided the following notes on the haul in which the animal was included: "Locality, 71° 22′ S., 16° 34′ W. Bottom temperature, 31°·9 F. Surface temperature, 29°·9 F. Depth, 1410 fathoms. Bottom, blue mud." The haul included specimens of nearly every group of animals from sponges to fishes.

It is proposed to name the new species *Bathydoris brownii*, in honour of Dr R. N. Rudmose Brown, naturalist to the expedition. To him and to Dr Bruce the author's thanks are due for permission to undertake the investigation of its anatomy.

The six known species of *Bathydoris* may be tabulated as follows:—

1. *B. abyssorum*, Bergh. 2425 fathoms, off New South Wales. "*Challenger.*"
2. *B. ingolfiana*, Bergh. 1870 fathoms, in Davis Strait. "*Ingolf.*"
3. *B. hodgsoni*, Eliot. 100 fathoms, off Coulman Island. "*Discovery.*"
4. *B. inflata*, Eliot. Depth not stated, off Coulman Island. "*Discovery.*"
5. *B. clavigera*, Thiele. Depth not stated, Gauss Station. "*Gauss.*"
6. *B. brownii*, sp. nov. 1410 fathoms, off Coats Land. "*Scotia.*"

The specimen was preserved in about 5 per cent. formaldehyde, and suffered very little distortion or contraction. The viscera were also in excellent condition for dissection, and even the histological preservation was found to be remarkably good when certain tissues were cut and stained for identification.

External Features.

The animal, as preserved, was 75 mm. long, 40 mm. broad, and 35 mm. in height. A thin, flabby foot margin extended about 8 mm. beyond the body all round and was rather bluntly pointed behind, while anteriorly its thickened edge ran transversely across the body behind the head, and had a deep glandular furrow extending into the lateral margin for some distance. The contraction of the foot when the animal was killed probably accounts for the distension of the dorsal integument and the extruded condition of the genital organs, which were forced out to the extent usual among Dorids during copulation. The mouth lies entirely on the ventral aspect, and is surrounded by crinkled lips surmounted by a bulging forehead, which extends laterally into rather long cylindrical oral tentacles. Nearly a third of the length of the ventral surface is occupied by the buccal region, the enormous size of which is a striking feature of the genus. The arched dorsal surface is covered by an integument which is delimited all round the body by a slight fringe at a distance of 4 or 5 mm. from the foot. Laterally this fringe or reduced mantle edge is represented by little more than a linear thickening of the skin. The dorsal integument is thin, transparent, and destitute of spicules, but, as in *hodgsoni*, *inflata*, and *clavigera*, the whole surface seems to have been originally studded with papillæ. Those that remain on exposed parts

of the back are smallest; while round the dorsal tentacles and along the notæal margin they are much larger. They seem to be more numerous in *brownii* than in any of the other three species possessing them. They are undoubtedly caducous, and, as recorded by ELIOT, the points of attachment of detached papillæ are marked on bare places by small circles with a spot in the centre. The only other conspicuous features of the dorsal surface are the dorsal tentacles and the anal complex, consisting of the anus, the renal pore, and the branchiæ. The rhinophores are club-shaped and perfoliated all round. There is no trace of a pocket. The branchiæ are two in number, and are placed symmetrically in front of the prominent anal papilla. Both numerically and structurally the branchiæ appear to differ very considerably from those of all the other species of *Bathydoris*. Thus, *B. abyssorum* has five and *ingolfiana* ten arranged in a circle in front of the anus, while ELIOT's species have eight and five or six respectively similarly arranged. The two tufts in *B. brownii* are united by a ridge which, on dissection, is found to contain the afferent and efferent vessels of the branchiæ. As the structure of the gills will be described later, it is sufficient here to mention that they are not fine dendritic structures like the gill-plumes represented by BERGH. The anal papilla is much shorter than in the other species, but this is probably due to the relatively greater local distension of the hinder end of the specimen. The renal papilla is inconspicuous, and lies in the median line between the anus and the base of the gills.

The extruded genitalia stand out conspicuously on the right side between the notæal margin and the foot, and are thrown further back than in the Dorids by the great size of the buccal region.

ANATOMICAL DESCRIPTION.

The importance of *Bathydoris* in any discussion of the interrelationships and classification of the Nudibranchs was recognised by both BERGH and ELIOT, and, during the examination of the anatomical structure of the present species, this importance became increasingly impressive as system after system was considered. This was deemed to justify a more complete and detailed account of the anatomy than has hitherto been given, especially as facilities for such an account were amply provided in virtue of the excellent preservation of the specimen. In the course of this memoir it will be noted that the description disagrees with those of BERGH and ELIOT on matters the bearings of which are of great theoretical interest. These contradictions are sometimes so striking that the inclusion of the species in the genus *Bathydoris* seemed jeopardised. The points of agreement, however, form such convincing evidence of generic identity that the serious divergencies here given must be regarded as corrections, based on examination of a more favourable specimen, of observations partially frustrated by the poor condition of the material observed by previous workers.

The various systems will now be considered in order.

The Alimentary System.

It will be seen in fig. 2 that the general plan of the alimentary system of *Bathydoris* resembles that of the typical Dorid, but a detailed examination shows that there are very important differences. The great size of the buccal mass (*b.m.*) was emphasised by Bergh as a characteristic feature of the genus. Indeed, Bergh claimed its supposed relationship with the Tritonids solely on the character of the buccal mass and the radula. The mouth is surrounded by two sets of lips, an outer and an inner. The outer lips are crinkled and fleshy, and leave a wide gape into which the inner lips project. These are merely the thickened rim of the outer integument limiting the buccal opening. The inner lips (*p.m.*, figs. 2 and 3) are a pair of lateral pads enclosing a relatively small opening leading into the buccal cavity. The pads have the consistency and appearance of hyaline cartilage Histological examination shows that the hyaline substance is a cuticular secretion which is continued in varying thickness as a lining of the alimentary tube from the buccal rim to the stomach. The underlying epithelium consists throughout of tall slender columnar cells, and corresponding columns of the secreted matter are faintly visible in the cuticle.

The buccal cavity contains a pair of dark-brown horny jaws (J., fig. 3) supported on muscular pads (P.J., fig. 3) which separate them from the globular odontophore (*o.*) occupying the middle of the floor. The free edges of the jaws are quite blunt, and each is produced into a slight beak opposite the mouth; so that they are probably used as a prehensile organ. The mouth must be capable of far more extension than might be supposed from its preserved state in order to bring the jaws into action. The radula (R.) is narrow in front and broad behind where it enters the radula sac, and the sac is entirely contained in the substance of the odontophoral mass. The first row of teeth has three teeth on either side of the rhachidian tooth and the radula broadens to 90. 1. 90, the formula of the youngest row. The total number of rows is about 50. The rhachidian tooth (Rh., fig. 4) has a broad base on which stands a backwardly directed cusp. The laterals ($L.^{i}$ to $L.^{v}$) are formed on the same plan, but the cusp bends from the base towards the middle line. The first four laterals differ from the rest in having shorter and blunter cusps. Unlike those of the other species, the extreme laterals show little sign of reduction. The teeth are firmly fixed in the specially thick cuticular covering of the radula mass, which is itself bilobed with a deep median depression. The direction of the cusps and of the underlying muscles suggests that the radula is used for gripping the food during trituration. The approximation of the cusps of the first laterals thus entailed would also explain the broken and irregular appearance of the rhachidian cusps as well as the reduction in length of the cusps of the first few laterals. Comparison with the figures published by Bergh and Eliot shows that the present species can be identified by its radula alone.

The œsophagus (*œ.* and *œ'.*, fig. 2) seems to differ from that of the other species in that it turns to the left, even at its origin from the buccal mass. It is a broad, sigmoid

tube with muscular walls lined, as already mentioned, by a thick cuticle. At its lower end it ends in a thin-walled sac, the stomach (*st.*, fig. 5), lying below the liver, and partially imbedded in its substance. The lining of the œsophagus is, throughout its length, thrown into twelve raised longitudinal bands (*b.o.*, fig. 5) which are covered with minute, blunt, brown cones of various sizes. As shown in fig. 6, the cones are partly imbedded in the cuticle of which they are specially resistent local modifications. The dark tint of the cuticle of the first half of the œsophagus and the extensive crinkling of its walls obscured the presence in it of the longitudinal bands which were only seen after clearing. ELIOT, who describes the denticulate bands in the second half of the œsophagus, may have overlooked them in the first half for the same reason. The same writer, in his account of *B. hodgsoni*, names the two regions of the œsophagus the first and second stomach—names which seem inappropriate for a thickly cuticularised tube which serves merely for the delivery of the food to the sac in which it is actually digested. The denticulate cuticle would, moreover, be quite ineffectual for the purpose of mastication, and probably serves as a protective layer against the coarse diet of mud, sponge, and small shells The thin-walled stomach stands at the junction of œsophagus, intestine (*int.*, fig. 5), and main liver ducts (*l.t.*) into the expanded ends of which the food enters for some distance, as in Dorids generally. At its junction with the œsophagus the stomach has a small pocket (*s.r.*) like that of the Dorids, which was not seen in any of the other species. Its function is not known, though such inapplicable names as "pancreas" and "gall-bladder" have been applied to it by different authors.

It may be mentioned that the similar stomach recess in *Doris tuberculata* secretes a glassy, refringent substance which is also found as a granular deposit on the mucosa of the intestine and on the massed *Halichondria* spicules passing down that tube. This suggests a protective function for the organ, its secretion acting as a lubricant for the passage of spiculose excrement down the intestine. The liver (*l.*, figs. 2 and 5) is a bulky organ which is not invaded by gonad or kidney, and is unlobed except in so far as the intestine and the lower end of the œsophagus lie in furrows on its surface. The intestine is a rather broad, smooth tube making an arc round the pericardium and ending by a sphinctered opening on the anal papilla.

The alimentary tract contained one large piece of undigested sponge, and sponge spicules were present in all parts of the stomach and intestine. There were also found much mud, bits of old shells, small pebbles, and the spines of Echinids. The animal is therefore probably an omnivorous feeder, though the prevalence of sponge suggests that it has predilections for that group, like the Dorids.

The salivary glands (*s.g.*, fig. 2) are flocculent and voluminous, forming a mass on each side pressed against the wall of the œsophagus, and opening by stout ducts on the hinder wall of the buccal cavity. BERGH and ELIOT mistook them for the blood glands, but their histological structure puts their salivary nature beyond doubt. Moreover, the true blood glands were found elsewhere.

The Nervous System. (Fig. 7.)

The brain of *Bathydoris* broadly resembles that of the Dorids, but with much less concentration of the ganglia. It lies on the top of the buccal bulb, the cerebral, pleural, and pedal pairs being quite separate, but lying close together. As fig. 7 shows, the ganglia are asymmetrical in shape and disposition. Each cerebral ganglion (*c.g.*) gives off four nerves from its anterior edge which go to the lips and oral tentacles, dividing as they go into a number of smaller nerves. The last bifurcations have small ganglionic swellings at the point of division, as in some Tectibranchs. On the posterior edge of the dorsal surface of the cerebral ganglion stands a small, almost sessile, proximal rhinophorial ganglion (*p.rh.g.*) which sends a stout nerve (*rh.n.*) to the dorsal tentacle. A distal rhinophorial ganglion swelling (not shown) marks the point of subdivision of the rhinophorial nerve as it enters the tentacle. No sub-cerebral commissure was found, so that the cerebrals are connected together below the alimentary tube by the stomato-gastric loop (*s.g.l.*) only. The pedal ganglia (*ped.g.*) are connected by a stout pedal (*ped.com.*) and a slender parapedal commissure (*p.ped.com.*). In the notch between the pleural and pedal ganglia of the right side is placed a small genital ganglion (*gen.g.*) which is broadly united to the pedal and connected with the pleural by a band of fibres from its lower aspect. From it four nerves go to the genitalia, both male and female, over the surface of which they distribute themselves with a number of local ganglionations on their courses.

The pleural ganglia (*pl.g.*) give off two main lateral nerves on each side which supply the whole of the dorsal integument, with the exception of the anterior region which receives a number of very fine nerves from the pleurals not shown in the figure. The longer pair of pleural nerves pass back to the anal region, where they anastomose with each other and with a visceral nerve (*br.n.*) from the under surface of the right pleural ganglion. From the ganglia on this plexus the gills are supplied as in *Doris tuberculata*. The visceral ganglion, so obvious on the under side of the right pleural ganglion of *Doris*, is not represented as a discrete mass in *Bathydoris*. The visceral ganglion of *Doris* would appear to include the visceral centres as well as the penial centre usually associated with the pedal. In *Bathydoris*, however, the genital centres of the visceral seem to be segregated from the rest and to be associated with the penial centre on the pedal to form a special genital ganglion. The long, finely ganglionated visceral loop (*v.l.*, *v.l.′*) about the middle of its course sends backwards the chief visceral nerve (*v.n.*), which, after giving a branch to the gastro-œsophageal anastomosis on the stomach and liver, continues its course as the reno-cardiac. Two delicate nerves from the pleuro-pedal angle (see diagram) supply the branches of the aorta. The stomato-gastric ganglia (*st.g.g.*) are relatively very large, but their size is not surprising when we remember the dimensions and muscular complexity of the buccal mechanism which they innervate. The inequality in length of the two cerebro-buccal connectives is probably the result of the sharp sinistral bend of the œsophagus. There are no separate

gastro-œsophageal ganglia, and the paired gastro-œsophageal nerves (*g.o.n.*) arise directly from the stomato-gastric ganglia. The paired nerves pass back in the connective-tissue investment of the œsophagus to the stomach, where they form a joint ganglionated anastomosis with the gastric branch of the visceral, as already described. From this plexus the stomach and liver receive their innervation, while the salivary glands are supplied from the gastro-œsophageals on their way down the œsophagus.

This compound system of gastro-hepatic ganglia is paralleled in the Dorids, where it was described by ALDER and HANCOCK, while DREYER has lately shown that an analogous arrangement is present in Aeolids and Tritonids.

Like the other species examined anatomically, *B. brownii* showed no trace of organs of sight, and otocysts could not be found by careful surface examination. They were, however, found on staining and clearing and also in sections of the brain. They are two small sacs placed close to the pleuro-pedal connectives on their lower aspect and partially imbedded in the connective-tissue capsule that surrounds the brain. The author has found small otocysts similarly placed in some of the Polyceratidæ. Otocysts were not found in the species examined by BERGH and by ELIOT.

THE EXCRETORY SYSTEM. (Fig. 8.)

The kidney of *Bathydoris* is unusually well developed. This was also noted by ELIOT, who described two fern-like organs lying over the liver as well as the renal syrinx. ELIOT, however, misconceived the nature of the renal organ, since he took the paired, fern-like structures to represent the main portion of the kidney, whereas they are merely outgrowths of its floor or ventral wall in the posterior half. The whole renal organ is a huge sac extending from almost the extreme posterior end of the body to within a short distance of the head, but narrowing in front on account of pressure between the alimentary canal and the genital mass. Posteriorly, its delicate dorsal wall is overlain by the pericardium, to which it is connected by fibres. Elsewhere it bulges free except where it is pinched by the intestinal loop (*int.*). This dorsal wall is throughout non-glandular, except at two points—namely, at its extreme anterior corner (*b.g.'*) and at a place in front of the pericardium (*b.g.''*) where a diverticulum of it lies as a flap across the intestine. These two points will be further mentioned in connection with the vascular system, because the two phagocytic or blood glands lie here adherent to the wall of the kidney. The glandular part of the kidney is therefore almost entirely confined to its ventral wall and to those parts of it which are folded inwards into the renal cavity as the two fern-like structures seen by ELIOT. These, however, are not two but six in number, the posterior pair being more fern-like than the other two which lie on the surface of the gonad (*h.g.*). These glandular regions coincide with the areas of distribution of great branches of the aorta, and the narrow strip-like folds forming the two anterior pairs may easily be mistaken for the arterial trunks themselves, which actually lie within them below the renal wall. The vascular

supply of the kidney is therefore purely arterial, and all the renal arteries arise from an aortic bulb (*a.c.*) opening into the ventricle at the point *o.v.* in fig. 8, and continuing forwards as the cephalic artery (*c.art.*). The extensions of the renal arteries into the gonad are not shown in fig. 8. The blood delivered by the renal arteries—which, as we have seen, occupy the crests of the glandular folds—passes on into venous lacunæ which lie deeper in the substance of the folds, and open into a great median venous space, lying between the kidney and liver behind, and between the gonad and liver in front. Into this median venous space also passes the blood that has traversed the gonad and liver.

The main collecting reservoir of the kidney lies behind the gonad, and in its hinder wall is seen the opening into the renal duct which leads to the exterior. In it originates the reno-pericardial duct (*r.p.d.*), consisting of a median tube opening in front by a funnel into the renal chamber, and a renal syrinx (*r.s.*) opening on the floor of the pericardium. The syrinx is a bulbous structure with a wide lumen which is almost filled with delicate laminate ingrowths of the epithelial lining. Sections of the floor of the kidney show that the gland cells lying in connection with the renal arteries contain concretions, often of large size, which stain faintly with basic dyes. The concretions collect in big vacuoles, which finally burst and liberate the excreted contents. The foliations of the wall of the syrinx are covered with cells of two kinds. The distal part of a lamina—namely, the free edge towards the middle of the lumen—is covered by ciliated cells only, the cilia being extremely long. The proximal part—namely, that nearer the wall of the syrinx—is glandular, and the cells contain fine granules of a substance which takes acid dyes. These cells are continued on to the wall of the pericardium. The renal organ of *Bathydoris* and its vascular supply are thus Dorid in type, the reno-pericardial duct, especially, being almost identical in structure with its homologue in *Doris*. The association with the blood glands, non-functional though that may be, the absence of ramifications into underlying organs, and its forward extension into the head region are features not paralleled among true Dorids.

The Vascular System. (Figs. 9 and 10.)

In general, the vascular system of *Bathydoris* resembles that of the Dorids, but in several respects distinct affinities with the blood system of the Pleurobranchids are exhibited. It may be conveniently described under the following heads:—

(1) *The Heart.*

The most obvious feature of the heart and pericardium is their asymmetrical disposition, since the antero-posterior axis, unlike that of the true Dorids, lies at an angle to the long axis of the body. The pericardium is a spacious cavity lying posteriorly on the surface of the kidney, with the reno-pericardial opening in its extreme right-hand corner.

The asymmetry of position mentioned above is an insignificant matter compared with the structural asymmetry shown by the heart itself. The typical Dorid heart is roughly an isosceles triangle with three efferent ducts opening into its base, the efferent branchial in the middle and the two lateral integumental sinuses at the corners. The auricle of *Bathydoris*, on the contrary, receives but one efferent vessel, which enters it at the right-hand side, the efferent branchial vessel and the lateral sinuses being confluent outside the pericardium altogether, as in the Pleurobranchids. The left side of the auricle is fused for some distance with the pericardial wall, along which it sends a muscular wing. This asymmetry, as we shall see later, is only one of many pre-Dorid and ancestral opisthobranch features exhibited by *Bathydoris*.

(2) *The Arterial System.*

Although the arterial system possesses no striking feature, it is proposed to describe it somewhat fully, because no comprehensive account exists of the arterial system of any Dorid except HANCOCK and EMBLETON's account of *Doris tuberculata* in their famous article in the *Philosophical Transactions of the Royal Society*. The ventricle (*v.*) is immediately followed by a large aortic bulb (*a.c.*) from which arise the renal arteries (see kidney), as well as vessels to the intestinal loop, the gonad and the periphery of the liver mass lying below. The aortic bulb is continued forwards as the main cephalic artery (*c.art.*) This gives off on the left the visceral artery (*v.art.*), running below the intestine and supplying the liver, stomach, and œsophagus. In fig. 9 the arterial trunks lying below the outlined viscera are dot-shaded. After giving off the genital arteries (*g.art.*) on the right, the cephalic artery bifurcates, one branch passing over the œsophagus to the left and the other below the buccal mass to the right. The left branch provides both salivary glands (*sal.g.*), the brain (*cer.art.*), and the buccal muscles of both sides, while the right branch goes direct into a spacious infra-pharyngeal lacuna (*lac.*), in which the left also ends. This lacuna was also found in *Doris tuberculata*. It should be noted that the cephalic artery forms a complete collar round the œsophagus and buccal bulb. From the central lacuna under the bulb arise a number of vessels. A median vessel passes straight up into the bulb (*buc.art.*); three run forward into the lips (*lab.art.*) and floor of the mouth, while a broad median vessel dips into the foot and bends backward in its substance, to continue throughout its length as a median pedal artery (*ped.art.*)

(3) *The General Hæmocœle.*

The irregular lacunar blood-space in which lie all the viscera is in *Bathydoris* nowhere spacious. It receives the blood that has passed through the tissues from the arteries, except the renal, gonadial, and hepatic blood, which is collected in another way already indicated in the description of the kidney. The hæmocœlic blood passes partly into the gills and partly into the dorsal integument, but the proportion of blood

that passes into the integument is much in excess of that in the Dorids. The thin skin, studded with papillæ, is conducive to this amplification of the tegumentary respiration in *Bathydoris*, while the thick, glandular, and spiculose skin of the Dorids has vitiated this system and necessitated the extension of the special gills. The dorsal wall of the hæmocœle is a membrane more or less bound to the underlying organs by conjunctive-tissue fibres. This membrane is separated from the dorsal integument by an empty space, but runs into it at the side of the body all round. Thus, when an incision is made through the dorsal body-wall, the space entered is not the hæmocœle, but this closed cavity between the body-wall and the dorsal wall of the hæmocœle. The same arrangement is present in the Dorids alone among Nudibranchs, though the shell-cavity of *Pleurobranchus* closely resembles the problematic dorsal cavity of the Dorids. Whatever be the nature of the cavity, HANCOCK and EMBLETON's name—peritoneum —for its lining should not be perpetuated. The passage of blood from the underlying hæmocœle into the skin and its papillary outgrowths takes place below the level of the edge of the dorsal hæmocœlic wall all round. The blood that runs from the hæmocœle to the gills passes along two narrow conduits on the posterior aspect of the liver (*h.v.*, fig. 10). This must be regarded as of secondary importance in the afferent branchial system.

(4) *The Afferent Branchial System.* (Fig. 10.)

Blood enters the branchiæ from two sources: (*a*) from the hæmocœle by the small paired ducts (*h.v.*) already mentioned, and (*b*) from a great median venous space (*m.s.*) lying above the liver, which receives the blood from the kidney, liver, and gonad. Just before narrowing in order to enter the gills (*a.b.v.*), it receives the paired ducts from the hæmocœle (*a*). (See also the description of the kidney.) The afferent space at the base of the gills is not a circle, as in the Dorids, but a transverse expansion of the afferent vein from which ramifying tubes run up the branchiæ.

(5) *The Efferent Branchials.*

The afferent and efferent venules in the gill-leaflets form continuous loops from the afferent to the efferent side of a gill lobe, and the efferent veins from the two gills join together to form a transverse space at the base of the gills similar to the contiguous afferent space. This space is connected with the auricle by a tube (*e.b.v.*) running to the right and entering the auricle at its right-hand corner.

(6) *The Efferent Tegumentary System.*

The blood that enters the skin and its papillæ from the hæmocœle returns from all sides into a circular sinus (*c.s.*) running round the edge of the pericardium. The efferent tubules returning blood into the sinus were described by BERGH as renal tubules in *B. abyssorum.* The sinus opens behind into the efferent branchial vein just before

it reaches the right corner of the pericardium to empty itself into the auricle. The circular sinus is also represented in the Pleurobranchids, where it also opens into the efferent vessel, but takes a wider sweep round the body. In the Dorids it is represented by the two lateral sinuses, which there, however, enter the auricle separately and directly.

(7) *The Blood Glands.* (*b.g.'* and *b.g.''* Figs. 8 and 9.)

The structures commonly called "blood glands" are characteristic of some Tectibranch families (Bullids and Pleurobranchids) and of the Dorids. They are lymphatic or phagocytic glands situated on the course of the cephalic artery and supplied by it. In the Dorids they lie in the head region near the brain, but in the Tectibranchs they are placed further back. In *Bathydoris* they form two separate masses united to the wall of the kidney. It is of some interest to note that in the Prosobranchs possessing them they are also associated with the kidney, so that in this, as in many other respects, *Bathydoris* presents features more primitive than the true Dorids, the equivalents of which are found among Tectibranchs rather than Nudibranchs. As already mentioned, Bergh and Eliot confused the unusual salivary glands with the blood glands, the identity of which they did not recognise.

The Respiratory System.

As already indicated in connection with the vascular system, the general pallial respiration is rendered more effective by the papillary outgrowths, and the blood so oxygenated returns into the circular sinus. The special respiratory organs or branchiæ are two tufts placed symmetrically on a transverse ridge in front of the anus. Each tuft stands on a broad base or stalk in such a way as to give the appearance of a roughly pinnate condition. The lobate units of the tuft resemble the pinnæ of the gill of *Pleurobranchæa*, being laminate on opposite faces of a wide rhachis, while the afferent and efferent vessels occupy its edges. The laminæ vary in size from mere ridges across the face of the rhachis to longish leaves which may themselves be provided with laminæ. In this way an irregular bipinnate condition is simulated. It will be seen that, by narrowing the rhachis so as to bring the ascending and descending vessels nearer together and regularising the pinnation, the Dorid plume would be produced. On the other hand, if the laminæ were equal in size and the tufts stretched along the ridge in a regular row, the sessile portion of a Pleurobranchid ctenidium would result. The gill of *Bathydoris brownii* would therefore appear to be in a condition intermediate between a typical Dorid rosette of plumes and a Tectibranch gill. There is, however, no indication of a circumanal circlet either in the gill itself or in the underlying vessels, and though the tufts are provided with muscles capable of reducing their height, they cannot be retracted below the general level of the integument.

The Reproductive System. (Fig. 12.)

No adequate description or figure of this system in a *Bathydoris* has hitherto been given, but both Eliot and Bergh give a somewhat hesitating impression that it is constructed on the Dorid plan. Since the universal triauly of known Dorids is one of their most striking characteristics, it is essential that on such a critical point our knowledge should be clear and definite.

The hermaphrodite gonad (*h.g.*) lies posteriorly below the kidney and above the liver within the arc made by the intestine. It is a yellowish, bi-convex lenticular body, truncated in front and with a minutely lobulated surface. The specimen was captured at the stage of male activity in the protandric cycle, since the male acini and ducts are full of sperms, while the eggs are small and lightly yolked. Its blood supply is an extension of the renal arterial system, branches from which pass through the lower wall of the kidney into its substance.

The common hermaphrodite duct (*c.h.d.*) leaves the gonad as a single slender tube. It is ampullated (*amp.*), as usual in Nudibranchs, but its extreme length escaped previous notice. After a short, slender portion beyond the ampulla, it divides into two tubes, the vas deferens (*v.d.*) and the oviduct (*o.d.*). The vas deferens is a comparatively short, coiled tube, expanded by the glands in its walls into a prostate for nearly the whole of its length. It enters the penis sac (*p.s.*) some distance from the end and runs a straight course to the tip of the everted penis imbedded in loose connective tissue and muscle fibres. The mode of extroversion of the penis, deducible from dissection of the everted organ, is represented in the section-diagrams (fig. 11, *a* and *b*), the dotted area representing loose fibrous tissue the perfusion of which with blood from the hæmocœle causes the extroversion. The penis is seen to be a partial introvert, since the end is retracted into the sac unchanged. This terminal portion (*p.*) presents a remarkable appearance on account of the sucker-like pits covering one side of it. It is possible that the pits, under control of the blood-pressure in the penis, really act as suckers on the smooth surface of the female atrial wall.

The oviduct soon enters the massive mucus-albumen gland complex (*m.g.* and *a.g.*), the structure of which could not be investigated on account of its stony hardness. The albumen gland could be recognised on the upper surface by its yellowish-brown colour and its granular consistency. The coils of the mucus gland end distally as the broad tube which opens into the female atrium. The atrium is turned out as in copulation: the first part of it has a highly crinkled surface, but inside this arise two leaf-like lips (*a.l.*), or folds of its surface, which between them enclose the entrance (*f.o.*) into the female channel. These valvular lips appear to be a characteristic feature of *Bathydoris*, because they are also partially shown in surface view in *B. clavigera* by Thiele. Within the valve on the posterior wall of the channel opens the vagina (*vg.*), which consists of a stout tube ending blindly in a globular recurved bursa copulatrix (*b.c.*).

There is no second sac on the course of the vagina, which is also the only connection between the bursa and the female channel. From this it follows that the hermaphrodite duct of *Bathydoris* divides but once—namely, into a male and a female duct. The Dorid duct bearing the so-called spermatocyst, and connecting the bursa with the region of fertilisation in the course of the oviduct, is totally unrepresented. In short, *Bathydoris brownii* is typically diaulic, like *Tritonia* and the Pleurobranchids.

Externally, the everted organs are surrounded by a rim representing the limit of the common genital vestibule of the male and female system.

Synopsis of Specific and Generic Characters.

When we come to analyse the differences between the foregoing account and those of the two previous investigators of the genus, we encounter considerable difficulties in deciding which are specific differences and which may be put forward as corrections. To the latter category we may presume to relegate all differences in regard to which previous statements have been qualified or made with reservation.

The specific distinctness of *Bathydoris brownii* is undoubtedly more striking than that of any of the other recorded species, and, since the animal was mature, there can be no question of its being the young of any one of them. Among characters presumably not of generic rank which distinguish the species may be mentioned the following:—

(1) The uniformity in size and shape of the lateral teeth of the radula.

(2) The pitted pad on the glans penis.

(3) The immediate sinistral bend of the œsophagus at its origin from the buccal mass and the unequal lengths of the cerebro-buccal connectives. The causal connection between these two features stamps them as true anatomical constants.

(4) The two tufted gills placed on a traverse ridge symmetrically in front of the anus.

On the basis adopted above, it is likely that the following features in which the present account differs from those of Bergh and Eliot may be regarded as of generic value:—

(1) The diauly of the reproductive system.

(2) The circular canal embracing the pericardium and collecting blood from the dorsal integument.

(3) The follicular nature and great size of the salivary glands.

(4) The presence of two blood glands on the wall of the kidney (the structures described as such by Bergh and Eliot turned out, on histological examination, to be the follicles of the salivary glands; the true blood glands were not seen by these authors).

(5) The asymmetrical opening of the efferent vein into the auricle.

(6) The great saccular kidney with its ventral wall thrown into folds.

(7) The segregation of the genital elements of the visceral into a distinct ganglion on the surface of the brain.

(8) The possession of a proximal and a distal rhinophorial ganglion.

(9) The cuticularisation of the wall of the alimentary canal as far as the stomach (the horny cones imbedded in the cuticle were described by ELIOT for *B. hodgsoni*, but no armature was found by BERGH in *B. abyssorum* and *B. ingolfiana*; its systematic value cannot therefore be assigned).

(10) The presence of a gastric cæcum.

(11) The presence of small otocysts below the pleuro-pedal connective.

The genus may now be defined in the following terms, of which some are supplementary to BERGH's original definition :—

Body highly arched and elliptical in outline. The edge of the notæum slight or wanting. Dorsal papillæ present or absent. Rhinophores placed rather far back, non-retractile, perfoliated. Gills in front of the anal papilla, variable in number, non-retractile. Buccal mass very bulky. Radula sac not an appendage. Dental formula n. 1. n. Buccal cavity with a thick cuticle extending down the œsophagus. Powerful jaws present. Œsophagus may have horny cones. Liver massive and unlobed, not invaded by any other viscus. Salivary glands follicular, flattened, with a stout duct. Cerebral and pleural ganglia distinct. Stomatogastric loop very long. No gastro-œsophageal ganglia, but the long gastro-œsophageal loop arises from the buccals. Eyes absent. Kidney saccular with laminate ingrowths of its ventral wall. Branchial and pallial efferents join before entering the right side of the auricle. Penis unarmed and massive. Hermaphrodite gland a compact mass. Reproductive system diaulic.

THE AFFINITIES OF BATHYDORIS.

BERGH and ELIOT have invested *Bathydoris* with a certain importance as a type combining the features of the Dorids with certain Tritonid characters, with preponderating affinities to the Dorids. The Tritonid features accentuated by BERGH were the buccal apparatus and the unarmed penis, while ELIOT rightly passes over the latter resemblance unnoticed, since an armature of the penis may be present or absent among the species of some genera of Dorids. As to the buccal apparatus, even a superficial examination shows that, when reference has been made to the great size of the buccal muscles and the jaws, the sole resemblance has been stated in full. In *Tritonia* the odontophoral mass arises from the dorsal wall of the buccal cavity and bulges downwards, while in *Bathydoris* that organ arises from the floor of the buccal cavity and bulges upwards. The mandibles are also quite differently placed and used in the two animals, those of *Tritonia* having their long, finely serrulated cutting edges facing the floor of the mouth cavity below the radula mass, while the blunt beaks of the mandibles of *Bathydoris* jut into the mouth above the radula. Moreover, the œsophagus takes its origin on the hinder aspect of the globular buccal bulb of *Bathydoris*, while the

œsophagus of *Tritonia* rises out of the dorsal surface of the bulb and well forward, the main bulk of muscles being behind it. These and corresponding differences in the muscular mechanism suffice to make good the statement made above, that the supposed resemblances are confined to size and the presence of powerful jaws. It should be mentioned that BERGH refers specially to *Bornella* in assigning Tritonid features to *Bathydoris*; without discussing the problematic relationship of *Bornella* to the Tritonids, suffice it to state that the large buccal apparatus of that form differs from that of both *Tritonia* and *Bathydoris*.

It is indeed likely that these three cases of powerful and mandibulate mouth parts are examples of convergence in unrelated types. The only other reference to a non-Dorid affinity of *Bathydoris* is made by ELIOT when he compares the armature of the "stomach" with that found in *Bornella*. This comparison is strange, coming from an author who has since, in the Ray Society's monograph, separated the two genera in his first cleavage of the Nudibranchs. In any case the comparison is untenable, since the two armatures are totally unlike in structure and position, that of *Bornella* being situated in a region of the alimentary tube *posterior* to the point of entrance of the liver ducts. On the foregoing grounds we must regard the proposed Tritonid and Bornellid affinities of *Bathydoris* as inadmissible. It is, however, obvious that the investigation of this last species has brought out certain features of the genus which render necessary the reopening of the discussion of its affinities and, as we shall see later, those of the Dorids generally. It is no less certain that the genus presents a combination of characters far more significant than that considered by BERGH when he assigned its affinities—namely, a Dorid gill of a primitive form, an asymmetrical heart and efferent branchial system, blood glands placed far back on the course of the aorta, a thin integument with scattered branchiate outgrowths, a diaulic reproductive system, a liver distinct from the gonad and kidney, a brain with separate ganglia, a nerve collar embracing the buccal bulb and not the œsophagus, and finally, but perhaps least significant, a powerful buccal apparatus.

That *Bathydoris* must be definitely placed among doridiform animals follows from its possession of the following striking Dorid characteristics:—

(*a*) The collocation of the anus, renal pore, and gills in the median line posteriorly. The gill is, however, more primitive than the typical rosette form common among Dorids, though primitive gills are also found in such types as *Trevelyana* and *Nembrotha*.

(*b*) With the exception of the buccal mass and the protected œsophagus, the alimentary canal is Dorid, even to the possession of a gastric cæcum, and those divergent features are adaptations to a coarser and more omnivorous diet. The enlargement of the salivary glands is probably due to the same cause.

(*c*) The kidney is a Dorid structure, the reno-pericardial tube and syrinx being practically identical with those of *Doris* as described by HANCOCK

and by HECHT. The absence of ramifications is, doubtless, a primitive character.

(*d*) The blood system is built essentially on Dorid lines, but presents a greater number of primitive features than any other. Chief among them are the possession of but one auricular efferent opening, the union of the circular collecting canal of the integumental system with the efferent branchial, and the position of the blood glands. It is noteworthy that these primitive features are points of agreement with the Tectibranchs, especially the Pleurobranchids.

(*e*) As to the reproductive system, its diaulic condition makes it more primitive than that of any other known Dorid; but, apart from that very important divergence, it closely resembles that of *Doris*, since the separation of the gonad from the liver is found in a typical Dorid like *Alloiodoris*.

(*f*) The nervous system, in spite of a close similarity to the Dorid type in most respects, differs from it in several important points. Of these, the length of the nerve collar and the position of the brain on the top of the buccal mass are paralleled in *Tritonia* and the Pleurobranchids, and should probably be regarded as primitive, while the distinctness of the ganglia of the brain and the absence of separate gastro-œsophageals, if primitive features, take us back to a condition earlier than that found in the Pleurobranchids and *Tritonia*. The fusion of the ganglia of the visceral loop with the pleurals is, on the other hand, a modern feature, as is the loss of eyes consequent on the adoption of a deep-water habitat.

We conclude, therefore, that *Bathydoris* is a highly primitive Dorid possessing some characters that adapt it to a specialised habitat and mode of life, while those that are primitive connect it with the Tectibranchs, particularly the Pleurobranchids among existing forms. The derivation of the Dorids from Pleurobranchid ancestors is, however, no new proposition. GUIART, for example, has recently advocated their union into one group, and PELSENEER has derived all Nudibranchs from the Pleurobranchids with *Tritonia* as an intermediate link.

BERGH's advocacy of a special relationship between *Bathydoris* and *Tritonia* on the evidence of the buccal apparatus has already been criticised. PELSENEER's position, however, takes a wider outlook, but takes no cognisance of *Bathydoris* at all. He bases his contention of the Tritonid origin of all Nudibranchs on the possession by *Tritonia*, in common with the Pleurobranchids, of a large number of primitive Nudibranch characters which are not found together in any other Nudibranchs. These are:—a frontal veil, formed by the fusion of the oral tentacles of the Pleurobranchid, a wide foot, a ventricle turned to the right, a broad radula, a nervous system placed on the buccal bulb, an œsophageal crop, extensive salivary glands, a saccular, unramified kidney, a long reno-pericardial tube, pericardial glands on the auricle, male and female openings in a common vestibule, and a lateral anus. Of these, it will be noticed that

Bathydoris possesses all except the lateral anus. Further, it retains oral tentacles in a condition more strongly reminiscent of those of *Pleurobranchæa* than that of the oral veil of *Tritonia*, while the separate ganglia of the brain and the separate gonad of *Bathydoris* can certainly not be regarded as new and derived features in that genus. Thus, excluding the case of the lateral anus, which will be considered separately, *Bathydoris*, which is essentially Dorid in construction, exhibits all the primitive features of *Tritonia*, some indeed being more primitive than the corresponding ones in *Tritonia*, the supposed ancestor. At this *reductio ad absurdum* we arrive by considering only those primitive features selected by Pelseneer, without calling in the evidence of the blood and respiratory systems wherein *Tritonia*, with its symmetrical auricle receiving blood from symmetrical lateral sinuses, appears very modern indeed. It is in the complete avoidance of any comparison between vascular and respiratory systems in *Tritonia* and Pleurobranchids that the weakness of the Tritonid theory of Nudibranch descent lies, and it is significant that on the characters of these very systems is primarily based any discussion of gastropod and even molluscan affinities. Previous application of this criterion in the Opisthobranchs has resulted in their cleavage into Tectibranchs with a ctenidial gill and Nudibranchs with pallial outgrowths of varied form and distribution replacing the lost ctenidium. Of these neomorphic gills the lateral tufts of *Tritonia* have been regarded as an early type, but it is not clear whether the Dorid circlet was derived from them by concentration or by local specialisation round a posterior anus or was evolved independently. Nor is it clear why modern writers on the Opisthobranchs have always accepted the neomorphic nature of the Dorid circlet. It is true that a comparison of the highly specialised, multipinnate plumes placed in a pit in the tuberculate dorsum of some Dorids provides no suggestion of homology with the ctenidium of a Tectibranch; but it is not such a comparison of extremes that evinces homologies. In *Bathydoris*, however, the gill is in two portions only, joined by a crinkled ridge, it shows but the beginnings of pinnation, its lobes have the broad laminæ running from the afferent to the efferent side seen in the ctenidium of the Tectibranch, and there is no suggestion of the circumanal ring in either the gill or the underlying vessels. From this point of view the extreme similarity of the condition of the auricle, the efferent branchial vessel, and the circular sinus in *Bathydoris* and the Pleurobranchids acquires a special significance. Evidence derived from the nature of the innervation is perhaps of doubtful value; but, so far as it goes, it is favourable to the present contention, since the Dorid gill is jointly innervated from pleural and visceral centres, while other Nudibranch gills receive no visceral nerves unless invaded by ramifications of the liver. The dorsal position of the Dorid gill should present little difficulty, since the pallial edge of the Dorids is undoubtedly a new formation of mechanical value which progressively increases in width within the group and is absent in many genera. In any case, the same difficulty would apply to the anus and renal pore, and there is no proposal to class them as new formations in the Dorids. The separation into two or more parts also forms no objection to the ctenidial nature of the Dorid

gill, since it is a progressive process in the group and is incipient in many Tectibranchs, including *Aplysia*. Moreover, at least one Dorid, *Trevelyana crocea*, has a single undivided laminate gill indistinguishable from a ctenidium. Furthermore, the three residual units of the pallial complex—namely, the kidney and its pore, the intestine with the anus, and the gill—occupy in the Dorids just those relative positions which they would occupy had they been turned over from the Tectibranch position into the median dorsal line. Here one is inclined to ask what is the nature of the great cavity, cut off from the underlying hæmocœle, which lies under the dorsal integument of the Dorid, but is absent in all other Nudibranchs. An exactly similar cavity in *Pleurobranchus* or *Oscanius* contains a shell-remnant, and is the shell-cavity. In the absence of any information regarding the metamorphosis of the veliger of either Dorids or Pleurobranchids, it is difficult to find any satisfactory reason for contradicting the homology of these two spaces.

It is on the above grounds proposed to define the Dorids as ctenidiate Opisthobranchs that have retained the shell-cavity and in which the elements of the pallial complex have moved dorsally into the median line. In this position the ctenidium has undergone progressive modification within the group, the retractile circlet being its highest development.

In *Tritonia*, on the other hand, the residual members of the pallial complex have remained in a more anterior position than they occupy in many Tectibranchs, and in that position the old molluscan gill has been lost. Whereas in the Dorids and Pleurobranchids the connection of the auricle with lateral integumentary sinuses is supplementary to the ctenidial connection, in *Tritonia* it is the sole remaining connection of the auricle with respiratory sinuses. As a primitive actenidiate animal, however, *Tritonia* retains many common features with the Dorids and Pleurobranchids, its nearest ctenidiate relatives.

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EXPLANATION OF PLATES I. AND II.

Bathydoris brownii.

Fig. 1. The animal seen from the dorsal side, natural size.

Fig. 2. General view of the alimentary system from above. *b.m.*, buccal mass; *cr.*, œsophageal crop; *int.*, intestine; *l.*, liver; *œ.*, œsophagus; *p.m.*, lateral pads of the inner lips; *s.g.*, salivary glands.

Fig. 3. Buccal cavity laid open from above. J., jaws; *o.*, odontophore; *œ.*, œsophagus; P.J., pads of the jaw; *p.m.*, pads of inner lips; R., radula.

Fig. 4. Portion of a half-row of the radula. L.[i]–L.[v], lateral teeth 1 to 5; *Rh.*, rhachidian tooth.

Fig. 5. Stomach and adjacent parts of the alimentary canal laid open; the cut is continued into the posterior lobe of the liver. *b.o.*, bands on the wall of the crop; *l.*, liver; *int.*, intestine; *l.t.*, liver ducts; *s.r.*, gastric cæcum; *st.*, stomach.

Fig. 6. Section across an œsophageal band. *b.c.*, brown cones; *ct.*, cuticle; *ep.*, epithelial layer; *m.*, muscle layers.

Fig. 7. Nervous system. *b.co.*, buccal commissure; *c.g.*, cerebral ganglion; *gen.g.*, genital ganglion; *g.o.n.*, gastro-œsophageal nerves; *ped.g.*, pedal ganglion; *ped.com.*, pedal commissure; *p.ped.com.*, parapedal commissure; *pl.g.*, pleural ganglion; *s.g.l.*, buccal loop; *st.g.g.*, stomato-gastric or buccal ganglion; *v.l.*, *v.l.*[i], visceral loop; *v.n.*, visceral nerve.

Fig. 8. Kidney with thin dorsal wall removed. *a.c.*, aortic bulb; *b.g.*[i], *b.g.*[ii], lobes of the kidney to which the blood glands are attached; *c.art.*, cephalic artery; *h.g.*, hermaphrodite gonad; *int.*, intestine; *o.r.*, opening of aortic swelling into the ventricle; *r.d.*, renal tube to exterior; *r.p.d.*, reno-pericardial duct; *r.s.*, renal syrinx.

Fig. 9. Arterial system. *a.c.*, aortic bulb; *b.g.*[i], *b.g.*[ii], blood glands; *c.art.*, cephalic artery; *cer.art.*, cerebral artery; *buc.art.*, buccal artery; *g.art.*, genital artery; *lab.art.*, labial arteries; *lac.*, lacuna under buccal mass; *ped.art.*, pedal artery; *sal.g.*, salivary gland; *v.art.*, visceral artery.

Fig. 10. Diagram of the afferent and efferent vessels. *a.b.v.*, afferent branchial vein; *aur.*, auricle; *c.s.*, circular sinus; *e.b.v.*, efferent branchial vein; *h.v.*, hæmocœlic vessels; *m.s.*, median sinus.

Fig. 11, *a* and *b*. Diagram showing the relation of the penis to its sheath in the retracted and protruded condition.

Fig. 12. General view of the reproductive system. *a.l.*, atrial lips; *a.g.*, albumen gland; *amp.*, ampulla; *b.c.*, bursa copulatrix; *c.h.d.*, common hermaphrodite duct; *f.o.*, female opening; *h.g.*, gonad; *m.g.*, mucus gland; *o.d.*, oviduct; *p.*, pitted pad on penis; *p.s.*, penis sac; *v.d.*, vas deferens; *vg.*, vagina.

EVANS: NEW SPECIES OF BATHYDORIS.

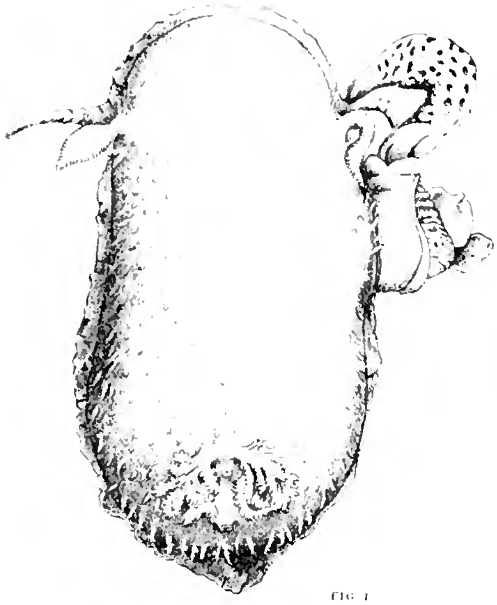
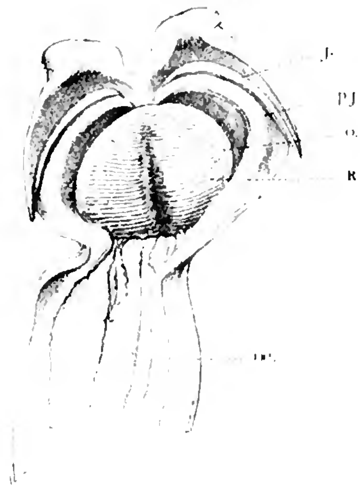


FIG. 1.



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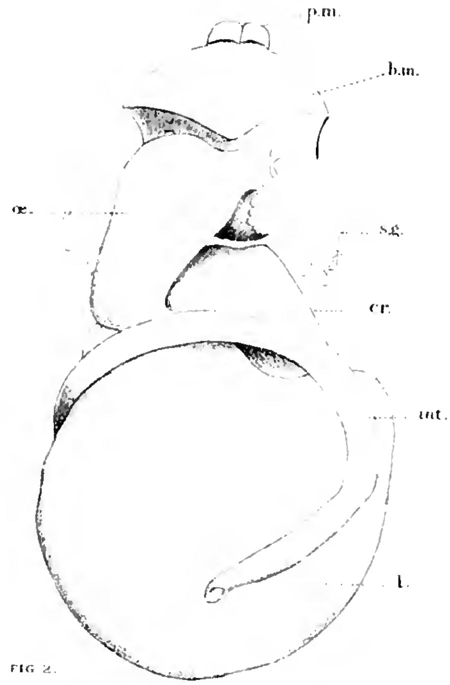
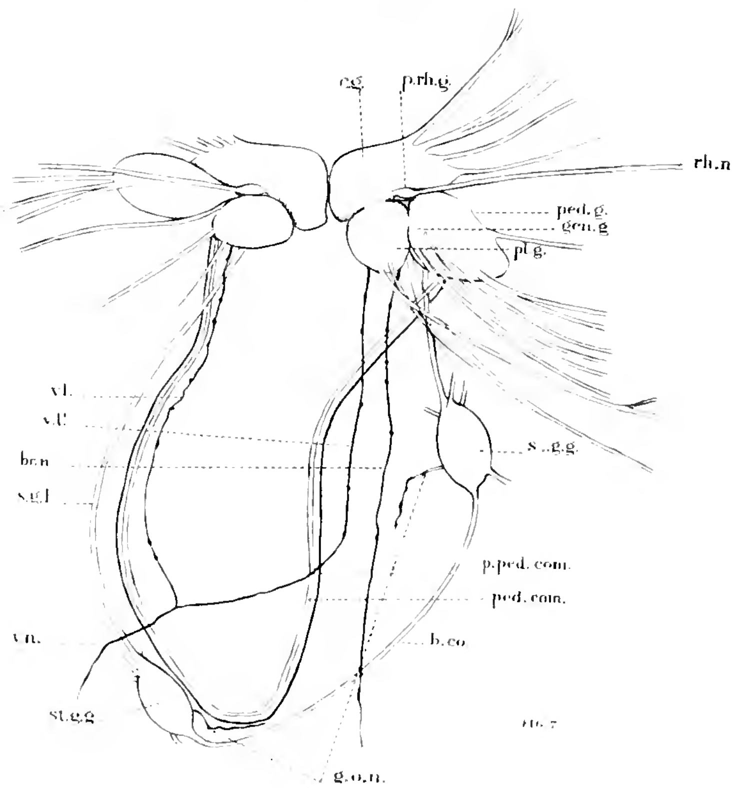


FIG. 2.

FIG. 5.



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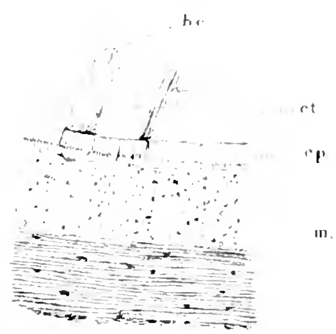

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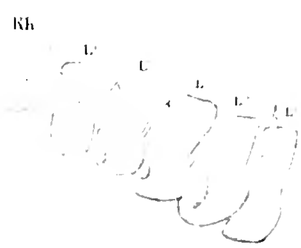
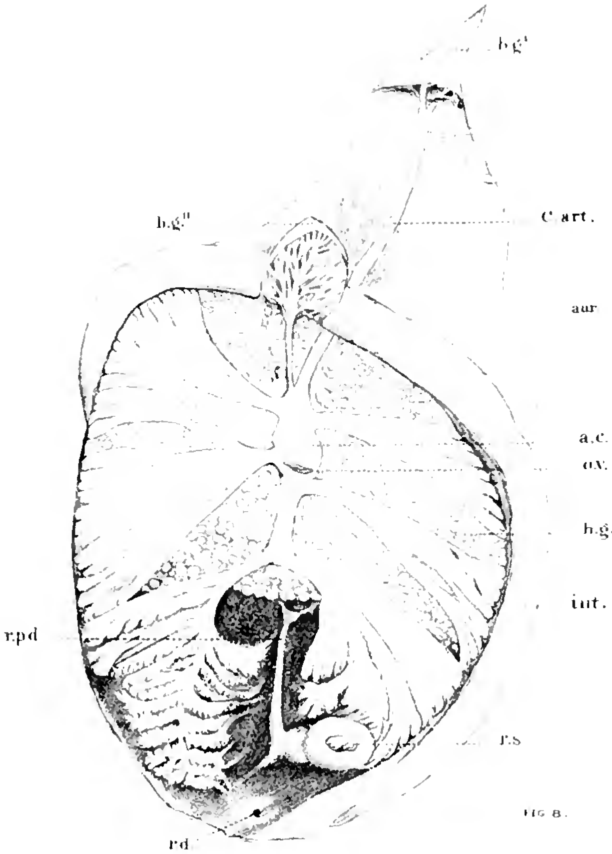


FIG. 4.

EVANS: NEW SPECIES OF BATHYDORIS.



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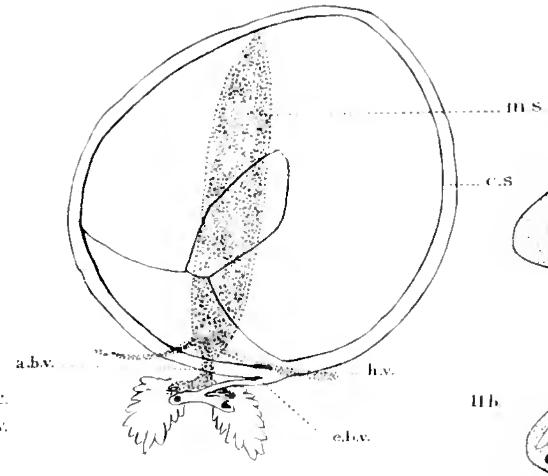

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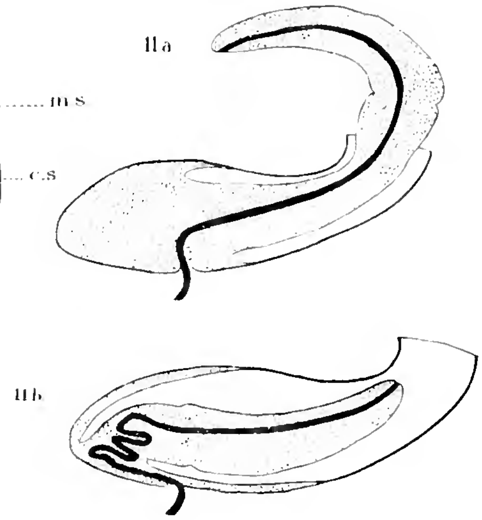


FIG. 11.

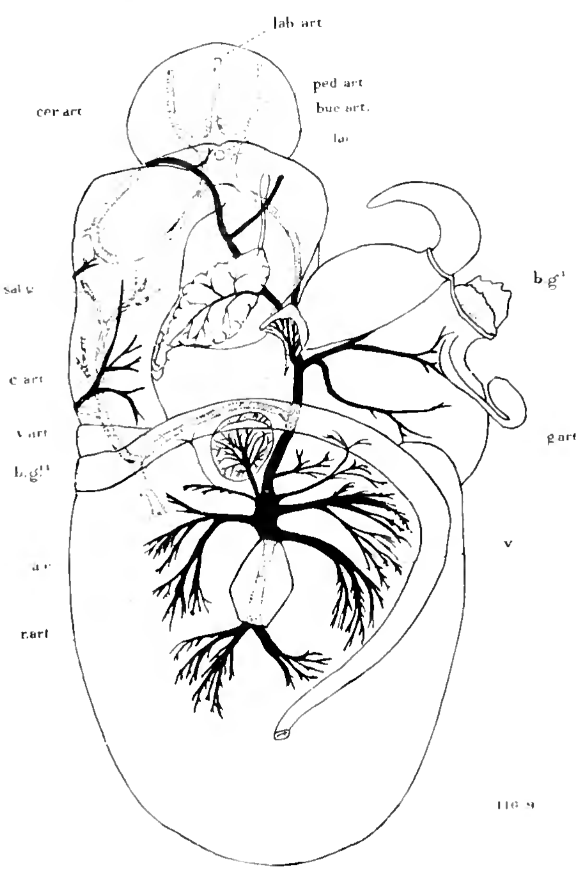


FIG. 9.

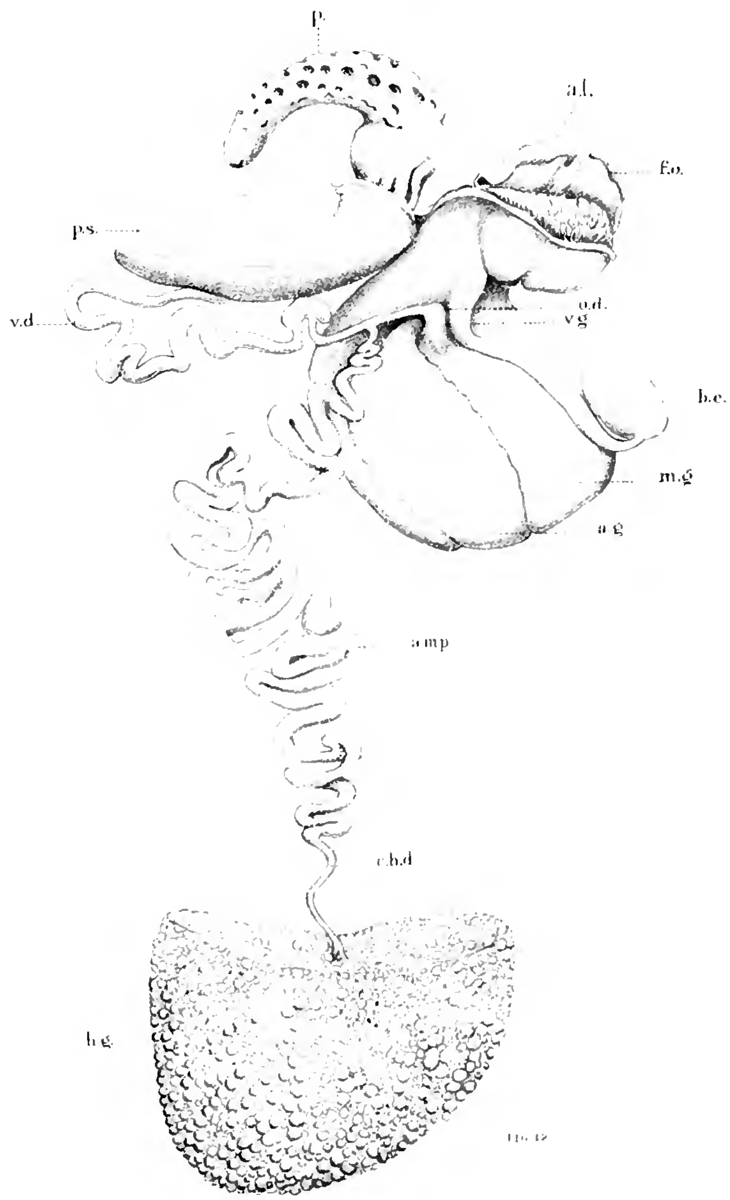


FIG. 12.

J. E., DEL.

PART XII.

POLYCHÆTA.

(SCLEROCHEILUS.)

XII.—A NEW SPECIES OF SCLEROCHEILUS, WITH A REVISION OF THE GENUS: SCOTTISH NATIONAL ANTARCTIC EXPEDITION.

By J. H. ASHWORTH, D.Sc.,
Lecturer in Invertebrate Zoology in the University of Edinburgh.

(*WITH ONE PLATE AND FOUR TEXT-FIGURES.*)

On a New Species of Sclerocheilus, with a Revision of the Genus.

By J. H. Ashworth, D.Sc., Lecturer in Invertebrate Zoology in the University of Edinburgh.* (With One Plate.)

(MS. received May 4, 1914. Read May 25, 1914. Issued separately July 2, 1915.)

CONTENTS.

The Polychæte family Scalibregmidæ comprises seven genera, the limits and inter-relationships of which are, however, still imperfectly known. The present paper results from a detailed study of one of these genera, a new species of which is described, chiefly from a specimen collected in Scotia Bay, South Orkneys, and entrusted to me for examination by Dr W. S. Bruce.

Description of the Specimen collected in Scotia Bay, South Orkneys.

This specimen, the only Scalibregmid found by the Scottish National Antarctic Expedition, was dredged on a stony bottom in ten fathoms at Station 325, in Scotia Bay, South Orkneys (lat. 60° 43′ 42″ S.; long. 44° 38′ 33″ W.), in August 1903.

The worm, which is yellowish brown in colour (in alcohol), is 19 mm. long. The anterior portion is broad; the maximum breadth, 3 mm., is reached about the level of the 10th segment; from this region the worm tapers gradually to the anal segment. The dorsal surface of the worm is strongly convex; the ventral surface is flattened, and there is a well-marked depression which extends along the mid-ventral line from the 2nd chætiferous segment almost to the anus.

The prostomium is drawn out at each side into a stout, bluntly conical process (Plate, fig. 1). On the middle region of the dorsal surface of the prostomium there is a Λ-shaped area of dark-brown pigment representing the eyes. The point of the Λ is median, and is situated near the centre of the prostomium; each limb of this pigmented area passes obliquely backwards and down the side of the prostomium.

The peristomium consists of a single, achætous ring, which is incomplete ventrally, where it forms the antero-lateral borders of the mouth (figs. 1, 2).

* A grant in aid of the expenses incurred during this research has been received from the Earl of Moray Endowment of the University of Edinburgh. The cost of the woodcuts and of the reproduction of the figures on the plate has been defrayed by the Carnegie Trust for the Universities of Scotland.

There are 43 chætiferous segments, the last of which is small and evidently recently formed; this is succeeded by the anal segment or pygidium (fig. 5).

The first chætiferous segment is narrow mid-dorsally, wider at the sides, *i.e.* where the parapodia are borne, and enlarged mid-ventrally, just behind the mouth, to form a well-marked "under-lip," the front margin of which is lobate—about six lobes being indicated (fig. 2). This segment consists of two annuli, the anterior of which is much the larger and bears the parapodia.

The second chætiferous segment (figs. 1, 2) is tri-annulate, there being a small ring in front of and another behind the chætiferous annulus. These smaller rings are visible on the dorsal and ventral aspects, but are not seen in the lateral view of the worm.

The third chætiferous segment has a similar constitution, but the fourth is composed of four rings—the chætiferous annulus together with two rings in front and one behind. All the succeeding segments up to and including the 41st are also four-ringed; the annulation is much less clear in the next segment, and the 43rd segment is a single narrow ring bearing very small parapodia.

In the fifth and succeeding chætiferous segments the annuli are subdivided on the dorsal surface * by antero-posterior furrows, so that the skin is marked out into more or less quadrangular areas, as is the case in other Scalibregmidæ. This sculpturing of the skin is well marked up to about the 23rd segment, but in the following segments is exhibited only by the chætiferous annuli.

The anal segment or pygidium is a short ring on which ventrally there are two slight enlargements (one on each side of the middle line), of which the left bears a slender cirrus about ·5 mm. in length (fig. 5). Other cirri have been lost; it is not possible to say with certainty how many, but probably the original number was four.

There is no trace of gills in this specimen.

Parapodia.

The notopodia and neuropodia of the first segment are little elevated above the general surface, but in the following segments there is right and left a prominent elevation extending over the whole lateral region of the segment from each of which the notopodium and neuropodium arise. From about the seventh segment onwards the raised area presents papilliform elevations the epidermis of which is glandular. There is usually one of these papillæ anterior and another posterior to the lip of each chætal sac, that just behind the lip of the chætal sac being especially well marked, forming in most of the segments a prominent, rounded knob.

A cirrus is present on the posterior face of the 18th left neuropodium, and on all the succeeding neuropodia up to and including the 40th. Cirri were probably originally present also on the 41st and 42nd segments, the parapodia of which are

* This subdivision of the annuli is feebly marked on the ventral surface.

slightly damaged and no longer bear cirri. In the 18th and 19th chaetiferous segments the neuropodial cirrus is a short conical process, ·05–·08 mm. in length; but those of the succeeding segments (fig. 6) rapidly increase in length, so that the cirri of the 33rd to 40th segments are finger-shaped and ·25–·3 mm. long (fig. 5). There are no notopodial cirri.

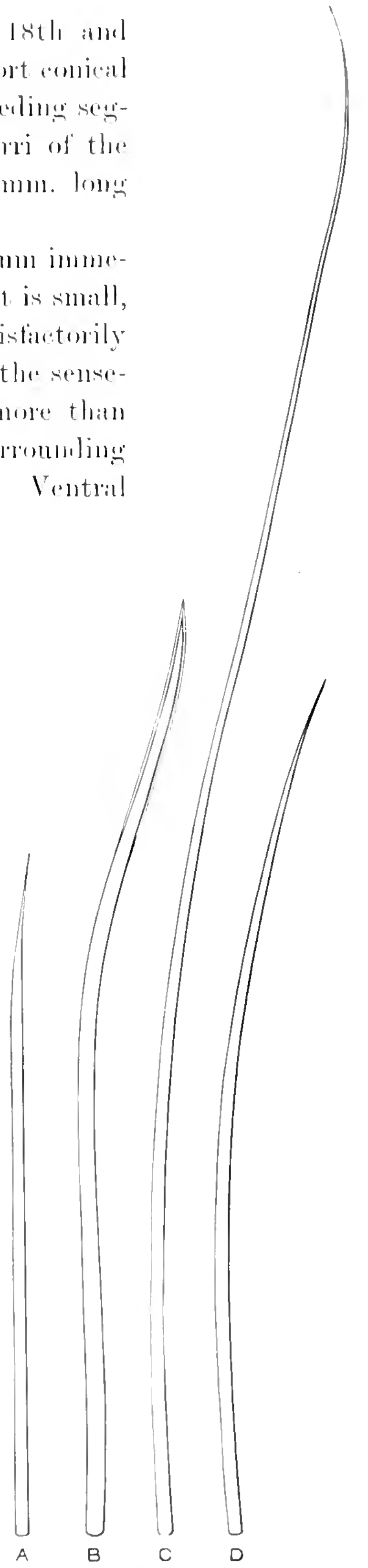
A lateral sense-organ is present in each parapodium immediately ventral to the base of the notopodium; but as it is small, and usually hidden in a depression, it can be seen satisfactorily only in sections. The surface of the organ which bears the sense-hairs is oval in outline, and its longer diameter is not more than about 40μ. This area is sunk below the level of the surrounding epidermis of the papilla on which the organ is situated. Ventral to the papilla bearing the sense-organ is a larger elevation the epidermis of which is glandular (fig. 6).

Chætæ.

The first notopodium bears chætæ of three or four different kinds, the relative positions and detailed structure of which have been studied as far as has been possible on the single intact notopodium available.

(i) There is an anterior series of about ten almost straight chætæ (text-fig. 1, A), approximately ·5 mm. long and $9–10\mu$ in maximum diameter. Each of these chætæ tapers rapidly in its distal fourth to a fine point, and the preparations indicate that the tips of these chætæ project little beyond the lips of the chætal sac.

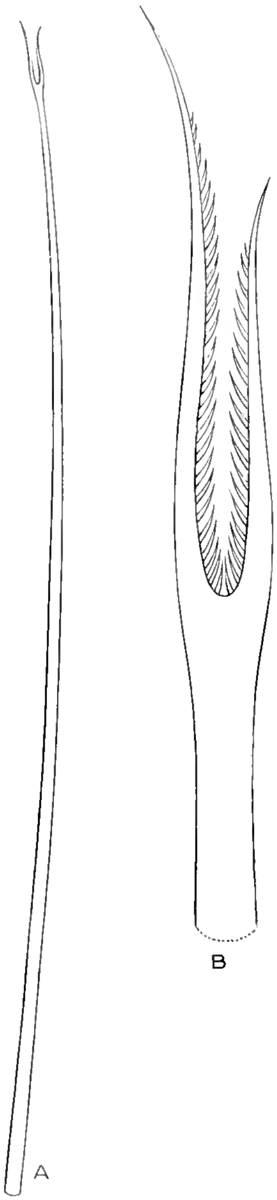
(ii) Close behind the chætæ just described is a series of about fifteen stronger chætæ, each bent in a characteristic manner (text-fig. 1, B). These chætæ are ·6–·65 mm. long, and their maximum diameter is $10–12\mu$. Each chæta tapers somewhat abruptly at its free end, and, when unworn, has along both sides, for a distance of ·15 mm. behind the fine-pointed tip, a narrow and very delicate lamina which readily breaks up into a close-set series of minute, pointed processes, so that this region of the chæta appears to be finely spinous. It is possible that these chætæ are really in two rows, an anterior row of about



TEXT-FIG. 1.—Chætæ from the first notopodium of the specimen from Scotia Bay. (×200.)

ten and a posterior row of about five; but if so, the two rows stand very close together.

(iii) Posterior to the foregoing are tapering, capillary chætæ, which appear to be of two types, shown in text-fig. 1, C and D. There are about forty chætæ of the type shown in fig. C; each of these is ·9–1·2 mm. in length and 7–9μ in maximum diameter, and tapers very gradually to a long fine point; consequently the distal portion of the chæta is very slender. There are fewer chætæ—about five—of the type shown in fig. D. These are about ·5–·6 mm. long, and taper more rapidly than the preceding. They are originally laminate near their tips, at any rate along one side, but the lamina is exceedingly fine.



TEXT-FIG. 2.—A. Furcate chæta from 25th parapodium of specimen from Scotia Bay. (×200.) B. Distal end of same chæta. (×1500.)

The first neuropodium bears capillary chætæ like those in the notopodium, and one chæta similar to that shown in text-fig. 1, A, was observed, but there are no stouter, bent chætæ like those occurring in the notopodium.

The chætæ of the second notopodium include representatives of all the four types present in the first notopodium; there is a single row of eight or nine of the bent chætæ.

The second neuropodium contains capillary chætæ similar to those of the first neuropodium, but there are also present two of the peculiar furcate chætæ (see below), so characteristic of the family Scalibregmidæ. There are no stouter, bent chætæ like those in the notopodium.

The armature of the third notopodium consists of (1) an anterior row of eight or nine curved chætæ, similar to those of the first two neuropodia; (2) several furcate chætæ standing near the former; (3) a posterior series of capillary chætæ of two types, similar to those shown in text-fig. 1, C, D.

The third neuropodium bears capillary chætæ of the usual two types and several furcate chætæ.

In the following segments the capillary chætæ become considerably stouter and longer, attaining a length of 1·7–1·8 mm. and a diameter of 12–13μ, and the differences between the two types gradually disappear, so that in most of the segments the two types are not distinguishable.

The furcate chætæ (text-fig. 2) form in both rami of the parapodium, from the third onwards, a fan-shaped series situated at the base and in front of the capillary chætæ. The shaft of each furcate chæta tapers gradually in its distal portion to the

base of the fork. The prongs, which are unequal in length, are usually curved, their fine tips pointing away from each other. In the anterior and middle segments the prongs are about 50μ and 35μ in length respectively, and in the posterior segments about 40μ and 25μ. Each prong bears along the inner edge of its proximal three-fourths a series of regularly-placed pointed processes. Only the fork and a short portion of the shaft proximal to it project beyond the lips of the chætal sac. In the middle region of the body there are about eight to twelve furcate chætæ in each of the rami of the parapodia.

Systematic Position of the Specimen from Scotia Bay.

The characters of the prostomium, parapodia, and chætæ, and especially the presence of the distinctive furcate chætæ, show clearly that the specimen described above belongs to the family Scalibregmidæ. It is referable to the *Scalibregma*-section* of the family, for the body is sub-fusiform and the prostomium T-shaped, its lateral angles being drawn out to form short tentacular processes. To this section of the family belong the following genera :—*Scalibregma* Rathke, *Pseudoscalibregma* Ashworth, *Sclerocheilus* Grube, *Asclerocheilus* Ashworth, and *Oncoscolex* Schmarda.

The Scotia Bay specimen differs from *Scalibregma* in several striking respects, *e.g.* the absence of gills and dorsal cirri, the ventral cirri are much more slender, and there are stronger chætæ in the first and second notopodia, whereas such chætæ are not present in *Scalibregma*. Further, *Scalibregma* rarely possesses eyes.†

The genus *Pseudoscalibregma* was suggested by the writer‡ to contain certain little-known, abranchiate worms resembling *Scalibregma* in general appearance, but their real relationship to *Scalibregma* remains to be ascertained. These worms appear to agree in their external features with *Scalibregma*, except in regard to the absence of gills, and so differ from the Scotia Bay specimen in the parapodial and chætal characters mentioned above.

The characters of *Asclerocheilus* are little known, but the single species—*Asclerocheilus intermedius* (=*Lipobranchius*§ *intermedius* Saint-Joseph)—referred

* See the classification suggested by the writer in *Quart. Journ. Micr. Sci.*, vol. xlv (1901), pp. 296, 297.

† I have examined about sixty specimens of *Scalibregma* varying in length from 4 mm. to 56 mm., and including five epitokous examples. Eyes are present in only two specimens, both ordinary non-epitokous forms. For one of these specimens, which has been in my possession twelve years, I am indebted to Dr E. J. Allen, F.R.S., who collected it near Plymouth ; for the other, collected in 1911 at Cap Lévi, near Cherbourg, I have to thank Professor Fauvel, who, on finding that this specimen possessed eyes, kindly sent it to me for examination. Both specimens are similar in size, but only one—the Plymouth specimen—is complete ; it is 30 mm. in length. In both, the eyes are on the right and left sides of the prostomium, and are wide apart, *i.e.* do not approach each other like those of *Sclerocheilus*. I have stained and cleared the Plymouth specimen, which exhibits on each side two eyes adjacent to each other, composed of a series of closely associated simple eyes, which in section are found to be similar in structure to those of *Sclerocheilus*.

‡ See *Quart. Journ. Micr. Sci.*, vol. xlv (1901), pp. 291, 292.

§ The genus *Lipobranchius* founded by Messrs Cunningham and Ramage to contain the species *L. jeffreysii* (=*Eumenia jeffreysii* M'Intosh) cannot well contain also *L. intermedius* Saint-Joseph, which differs from the former in several respects, but especially in the nature of the chætæ of the first and second notopodia. A thorough revision

to this genus lacks eyes and neuropodial cirri, and in these respects, as well as in the form of the anal cirri, and the chætæ of the first and second notopodia, it differs from the Scotia Bay specimen.

The structure of *Oncoscolex* is also imperfectly known, but, as represented by the type-species *O. dicranochætus* Schmarda, it differs from the Scotia Bay specimen, for in the former the segments are composed of not more than three rings, the parapodia do not bear cirri, and stronger chætæ are not present in the first and second chætiferous segments.

The specimen under consideration cannot, therefore, be referred to any of the four genera just discussed, nor do its characters entirely agree with those generally accepted for the genus *Sclerocheilus*. The differential characters of this genus, as represented by the type-species, *S. minutus* Grube, have been emended and stated thus by SAINT-JOSEPH * :—Prostomium small, with thick lateral processes and with eyes; notopodium and neuropodium of first chætiferous segment bear capillary chætæ and, a little above the neuropodium, five or six large, retractile, curved acicula, together with an equal number of slender and shorter acicula; the parapodial rami of the other segments bear capillary and furcate chætæ; small neuropodial cirri are borne on the last segments only; anus surrounded by five or six cirri; gills absent.

I have recently re-examined the series of specimens of *S. minutus* at my disposal, and have also, by the courtesy of Professor ANT. COLLIN, had the privilege of examining the entire series of the original specimens collected by GRUBE, and preserved in the Königliches Zoologisches Museum, Berlin, and am able to modify and supplement the characters given above.

OBSERVATIONS ON *SCLEROCHEILUS MINUTUS* GRUBE.

The prostomium (fig. 7) is drawn out antero-laterally into two stout processes, and bears eyes dorsally. The eyes † vary in development in different specimens; in some they are comparatively small, and the right and left eyes are separated by a distinct interval, but in other specimens they are larger, and in several cases are in contact, or are actually fused in front, forming a Λ-shaped, brown pigmented area. Near the posterior margin of these large eyes there is, on one or both sides, a simple eye, about 9μ in diameter, consisting of a cup-shaped mass of pigment-spherules and a spherical lens. This eye is situated below the epidermis, on or in the brain, and is therefore not seen except in cleared specimens.

Between the prostomium and peristomium there is on each side a protrusible

of the genera *Lipobranchius* and *Eumenia* is required, and the relationship of *L. jeffreysii* to *E. crassa* should be re-investigated. I have collected considerable material in view of undertaking such revision, but until I have the opportunity of examining certain types, which have been imperfectly described, the work is necessarily at a standstill.

* *Ann. Sci. Nat. Zool.*, vii sér., tome xvii (1894), p. 104 *et seq.*

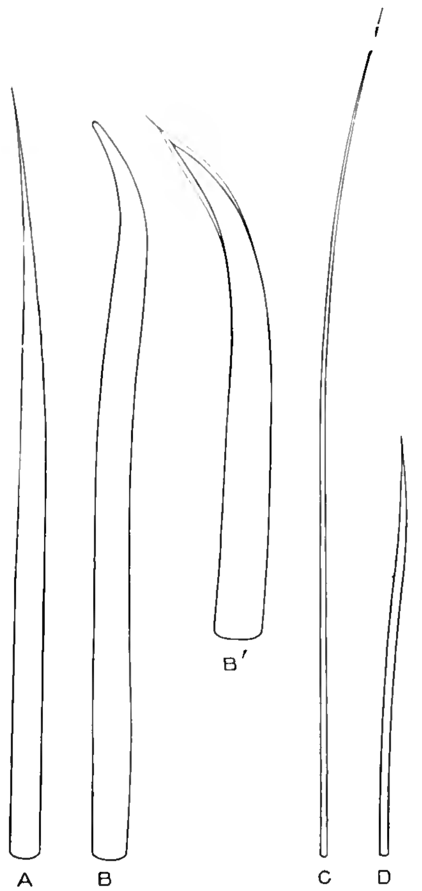
† For an account of the structure of the eyes, see A. et L. DEHORNE, *Arch. Zool. Expér.*, tome liii (1913), pp. 85–90.

nuchal organ, which, when everted, forms a sausage-shaped mass of considerable size (see fig. 7).

The peristomium is a single achætous ring, incomplete ventrally.

The first two or three chætiferous segments are usually bi-annulate, but the remaining segments, except a few of those last formed, are subdivided into four rings.

The stronger, curved chætæ ("acicula" of SAINT-JOSEPH) on each side of the first



TEXT-FIG. 3.—A, B, C, D. Chætæ from the first notopodium of a specimen of *Sclerocheilus minutus*, 18·5 mm. long. (×200.)
B′. A chæta which had not come into use, from the first notopodium of a specimen 11 mm. long. (×300.)

chætiferous segment are undoubtedly part of the armature of the notopodium, and form a portion of the anterior series of chætæ. The following is a brief account of the chief chætal characters resulting from a study of specimens 11 to 18·5 mm. long.

The first notopodium contains three kinds of chætæ:—

(i) Strong and almost straight chætæ, which taper distally to a fine point (text-fig. 3, A). Each of these chætæ is about ·5 mm. in length and 15–20μ in maximum diameter, and in all the specimens examined only the tips* of these chætæ project

* Not more than about ·04 mm.

beyond the lips of the chætal sac. There are generally four to six fully formed chætæ of this type, and two to five in course of formation, constituting the most anterior row of chætæ in the notopodium.

(ii) Stronger chætæ (the "acicula" of Saint-Joseph), which lie in a row close behind the chætæ just described. These chætæ (text-fig. 3, B), which are about ·5–·55 mm. long and attain a diameter of 24–28μ, are curved distally, and project considerably beyond the lips of the chætal sac (Plate, fig. 8). Each chæta usually presents a blunt tip, but if one of these chætæ be examined before it has come into use it is found to be pointed at the tip and to be there enveloped by a flat sheath (visible as a delicate lamina on each side of the chæta), which also runs out into a fine, flexible tip (text-fig. 3, B′). When the chæta comes into use, the tip of the sheath is worn away; then the laminæ break up into minute pointed processes and soon disappear, and the tip of the chæta itself becomes blunted, assuming the form shown in text-fig. 3, B. There are usually three to five of these chætæ in use, and two or three in course of formation.

(iii) Capillary chætæ, the maximum diameter of which does not exceed 4μ (text-fig. 3, C). These taper gradually to fine points. From eight to fifteen fully formed chætæ of this type, each about ·5–·55 mm. long, are present, together with a few in course of formation. In one specimen the first notopodium of each side bears, among the capillary chætæ just described, one or two slightly stouter and shorter bristles (text-fig. 3, D) which taper more rapidly at their free ends. These chætæ are about ·3 mm. long and 5μ in diameter.

The series of stronger chætæ (text-fig. 3, A, B) arise in two closely apposed rows near the bottom of the large chætal sac, while the slender chætæ (C, D) arise more dorsally and on the posterior wall of the chætal sac. The two series of stouter chætæ stand well in front of the slender ones. The latter usually point backwards, while the strong, curved chætæ (the straight chætæ (A) in the anterior row are usually scarcely seen on external examination of the specimen) point in a quite different direction, either antero-dorsally or latero-dorsally. As the stout and slender chætæ are so different in appearance and direction, and are comparatively widely separated from each other at their exits from the chætal sac, it is scarcely surprising that the curved chætæ have not been considered to be part of the notopodial armature, but have been referred to a region between notopodium and neuropodium, the notopodium being regarded as having capillary chætæ only. There can, however, be no doubt that the strong chætæ belong to the notopodium. The lip of the chætal sac immediately to the outer side of the curved chætæ is very well developed, forming a prominent feature of the first chætiferous segment (fig. 8).

The first neuropodium is a simple conical elevation bearing capillary chætæ only. These appear to be arranged in two rows—an anterior row of about eight or ten chætæ similar to that shown in text-fig. 3, D, and a posterior row of thirty or forty longer and more slender chætæ like that represented in text-fig. 3, C.

The armature of the second notopodium and neuropodium is composed of two series of capillary chætæ, of about ten and forty respectively, similar to but rather longer than those in the first neuropodium. The chætæ of the anterior row are proportionately longer, and hence there is less difference in length between them and the chætæ of the posterior row. In several of the specimens examined there are in the second notopodium or neuropodium, or in both, two, three, or four furcate chætæ, but these are neither so large nor so well formed in regard to their prongs as those found in the following segments. They are very fragile, and perhaps this explains why they are not seen in preparations of the second parapodium in all cases.

In the notopodium and neuropodium of the third and following segments the capillary chætæ are similar to those of the second parapodium, but in addition there is an anterior series of furcate chætæ the prongs* of which agree almost exactly in size and proportions with those shown in text-fig. 2 (p. 296), but the shafts are rather shorter.

The parapodia of *S. minutus* are very similar to those of the Scotia Bay specimen; the figure of one of the latter (fig. 6) would serve equally well for a parapodium from about the 36th segment of *S. minutus*, except that the latter is smaller (about three-fourths the size shown).

Saint-Joseph states that behind the 22nd segment the parapodia bear neuropodial cirri, and a similar statement is made by Professor M'Intosh and by M. and Mme. Dehorne. I have examined fifteen well-preserved specimens from different localities—the Adriatic, Saint-Vaast, Plymouth, and the west coast of Ireland—and find that the most anterior neuropodial cirrus is situated on the 25th, 27th, 29th, or 31st chætiferous segment in the various specimens. Of five specimens from the Adriatic (collected by Grube) in which the neurocirri are preserved, three bear minute cirri on the 25th segment; in the other two the first neurocirri are on the 27th segment. Of the four specimens from Saint-Vaast, two have the first neurocirrus on the 27th segment, the other two on the 31st segment. The specimen from Plymouth presents its first neurocirrus on the 27th segment. Of the five specimens from the west coast of Ireland, two have the first neurocirrus on the 29th segment, and three on the 31st. In Grube's figure † of *S. minutus* the first neurocirrus is shown on the 30th chætiferous segment. As Grube ‡ remarked, the cirri are not respiratory structures, for blood does not enter them. They are purely sensory, as the presence upon them of sense-hairs indicates, and are composed of epidermal cells surrounding a thin axial strand, formed apparently of nerve fibrils.

One of the neuropodia examined, from a specimen from Blacksod Bay, Co. Mayo,

* In a neuropodium from one of the specimens from Blacksod Bay, Co. Mayo, Ireland, there occurs a furcate chæta with an additional (third) prong, arising from between the bases of the two normal ones. This prong is shorter than either of the normal ones, the lengths being—normal prongs, 45μ and 27μ respectively; additional prong, 18μ.

† *Arch. f. Naturg.*, Jahrg. xxix, Bd. i (1863), Taf. v, fig. 3.

‡ 46 *Jahresber. Schles. Ges.* (1868), 1869, p. 67.

Ireland, possessed, in the usual position, two cirri practically equal in length and arising close together.

A small lateral sense-organ is present just ventral to the base of each notopodium, *i.e.* in a position corresponding to the "Seitenorgan" of *Scalibregma*, and its retractor muscle is usually related to the notopodial musculature. Each sense-organ is (in the larger segments) a convex elevation of the epidermis, about 50μ long and 20μ wide, traversed dorso-ventrally along its middle by the "hair-field" bearing long, delicate sense-hairs.* Between the sense-organ and the neuropodium there is invariably an epidermal papilla of considerable size, the cells of which are glandular, some of them ("bacilliparous follicles," CLAPARÈDE) producing curious rod-like secretions, usually sinuous in form.

The number of chætiferous segments in the complete specimens examined varies from 44 to 52.

The anal segment or pygidium bears long cirri, slightly thickened at their distal ends (fig. 9). These cirri are solid, like the neurocirri, being composed of epidermal cells with an axial strand of connective tissue and nerve-fibrils. There is evidently some variation in the number of the anal cirri. Of the six specimens with complete anal cirri which I have examined, one has five and each of the others four cirri. GRUBE described and figured four cirri in his original account of the species; SAINT-JOSEPH states that there are five or six; and Professor M'INTOSH and M. and Mme. DEHORNE found five in their specimens.

The Scotia Bay specimen agrees with *Sclerocheilus minutus* in the form of the prostomium and the presence thereon of pigmented eyes, in the division of the segments into four annuli, in the general characters of the parapodia and in the presence thereon of lateral sense-organs, in the possession by the posterior segments of neuropodial cirri, in the presence of anal cirri, and in the absence of gills. The stronger, bent chætæ present in the first three notopodia of the Scotia Bay specimen are evidently homologous with the much stronger chætæ of the first segment of *S. minutus*, and the three other types of chætæ present in the first notopodium of the Scotia Bay specimen have their homologues in the corresponding notopodium of *S. minutus*. These agreements in structure show that the Scotia Bay specimen is closely related to *S. minutus*, and should certainly be placed in the genus *Sclerocheilus* as a new species, for which I propose the name *S. antarcticus*.

OBSERVATIONS ON *SCLEROCHEILUS PACIFICUS* J. P. MOORE.

Only two species of *Sclerocheilus* have hitherto been described—namely, *S. minutus*, the chief external characters of which have been already stated, and *S. pacificus* J. P. Moore, 1909, from Monterey Bay, California. By the courtesy of

* Since this was written the sense-organs have been briefly described by M. and Mme. DEHORNE in *Arch. Zool. Expér.*, tome liii (1913), p. 72.

Dr J. PERCY MOORE I have been able to examine the co-type of the latter species. The specimen is not in good condition, and I cannot add much to the account which Dr MOORE* has given of the species, but my examination of the specimen leads me to the conclusion that it should not be placed in the genus *Sclerocheilus*. Dr MOORE'S specimen differs from *Sclerocheilus* in the following characters:—(1) the absence of stronger chætæ in the first notopodium; (2) the absence of neuropodial cirri; (3) the segments are not four-ringed but three-ringed. It is, of course, possible that neuropodial cirri were originally present and have been lost, but had they been destroyed there would, I think, have been more evidence of damage to the parapodia. Further, Dr MOORE states that in the larger and better-preserved type-specimen there are no neuropodial cirri, and it may therefore be concluded that these organs were not present in life. Dr MOORE'S species seems to be much more nearly related to the genus *Oncoscolex* than to *Sclerocheilus*, for it agrees with the former genus in:—(1) the segments from the 5th to about the 30th are tri-annulate, those further back (as far as about the 50th †) are bi-annulate; (2) the absence of parapodial cirri; and (3) the absence of stronger chætæ in the first notopodium. So far as I can see, *S. pacificus* differs from *Oncoscolex dicranochætus* only in the shape of the eyes,‡ a difference which is probably of little account. Until I have had the opportunity of examining the better-preserved type-specimen, I am not prepared to give a final opinion on the systematic position of *S. pacificus*, but the information at present available indicates that the species should not be referred to the genus *Sclerocheilus*, and I believe it will prove to belong to the genus *Oncoscolex*.

SCLEROCHEILUS CÆCUS SAINT-JOSEPH.

SAINT-JOSEPH § recorded the capture of examples of *S. cæcus*, but this species was never described, the only information given about it being contained in the single phrase, "*Sclerocheilus cæcus*, différant sensiblement du *Sclerocheilus minutus* Gr." *S. cæcus* is therefore a *nomen nudum*, but there can be little doubt that the specimens referred to were those subsequently described by SAINT-JOSEPH under the name *Lipobranchius intermedius*.‖

OBSERVATIONS ON A SPECIMEN OF "*EUMENIA OCULATA*."

The worm recorded by Dr CH. GRAVIER ¶ as *Eumenia oculata* Ehlers appeared to me to be closely related to the Scotia Bay specimen. Dr GRAVIER has kindly lent

* *Proc. Acad. Nat. Sci. Philadelphia*, 1909, p. 282.
† The specimen has 62 chætiferous segments.
‡ Which are approximately round or oval in *O. dicranochætus*, and irregularly triangular in *S. pacificus*.
§ *C. R. Acad. Sci. Paris*, tome ci (1885), p. 1511.
‖ See above, p. 409.
¶ *Deuxième Expéd. Antarct. Franç.: Annélides Polychètes*, 1911, p. 112.

me his specimen, and I am able to add some details to those given in his short account of it. This worm was taken at low water on the east coast of Petermann Island (lat. 65° 11′ S., long. 64° 10′ W.), off Graham Land, on 31st October, 1909. The specimen is in two portions; the anterior region is moderately well preserved, but the posterior portion is very fragile and is no longer intact behind. The worm was originally 11 mm. long. Its maximum width is 1·4 mm.

The prostomium is only partially seen, for both nuchal organs are everted, forming two lobulated masses which conceal a considerable portion of the prostomium (fig. 3). The antero-lateral processes of the prostomium are stout and rounded at their tips. The eyes, which are present on the dorsal surface of the prostomium, diverge as they pass backwards; they are not in contact at their anterior ends.

The peristomium consists of a single achætous ring which is broader ventrally, where it is incomplete (fig. 4).

The first and second chætiferous segments are each bi-annulate, the third and fourth show indications of subdivision into four rings, and the fifth and following segments, as far as they are still present (*i.e.* up to the 28th; there were originally 34 chætiferous segments), are clearly four-ringed. The rings are subdivided, on the dorsal side at any rate, into quadrangular areas.

The posterior end is now wanting, but Dr GRAVIER states that there were four short, slender, anal cirri.

The contours of the parapodia are not well preserved, but they were evidently of similar form to those of the Scotia Bay specimen (*cf.* fig. 6). Finger-shaped neuropodial cirri are present in the 21st * and following chætiferous segments.

There are no gills.

The specimen is not sufficiently well preserved to have retained its lateral sense-organs, and these have, therefore, not been looked for.

Each of the first three notopodia bears, in front of the slender, tapering chætæ, a number of stronger, shorter, bent chætæ, which taper much more abruptly at their free ends. In the second notopodium, which I excised for examination, there are four kinds of chætæ practically identical in form with those described from the Scotia Bay specimen (see pp. 299, 300). The chætæ from Dr GRAVIER's specimen are, however, smaller, being about two-thirds the length and thickness of those of the Scotia Bay specimen. There are several chætæ like that shown in text-fig. 1, A; these are about ·35 mm. in length and 6μ in greatest diameter. Nine stronger, bent chætæ (text-fig. 4) are present; these are about ·45 mm. long and 9μ in maximum diameter. The longer capillary chætæ (*cf.* text-fig. 1, C), of which there are about thirty, are approximately ·8 mm. in length and 6μ in greatest diameter; among these are several shorter capillary chætæ (*cf.* text-fig. 1, D) about ·5 mm. long. I have not thought it necessary to figure all these types of chætæ, but a figure of one of the

* Assuming, as is apparently the case, that there are no segments missing between the anterior and posterior portions into which the specimen is now divided.

bent chætæ is given to show that it is practically identical with those of the Scotia Bay specimen (*cf.* text-fig. 1, B, p. 295, and text-fig. 4).

The first neuropodium bears capillary chætæ of the two types shown in text-fig. 1, C, D. The third notopodium and neuropodium were not excised for examination, but the former contains an anterior row of eight stronger, bent chætæ, like those in the first two notopodia.

The fourth and following parapodia, which do not bear stronger, bent chætæ, contain in each ramus capillary chætæ and about half a dozen furcate chætæ identical in form and in the dimensions of their prongs with those described on p. 296, but their shafts are shorter (about ·4 mm. long).

I have recently had the opportunity of examining the type-specimen of *Eumenia oculata* Ehlers,* which was sent to me from the Königliches Zoologisches Museum, Berlin, through the kindness of Professor Ant. Collin, and I find that Dr Gravier's specimen does not agree with the type, for in the latter most of the chætiferous segments are three-ringed, stronger chætæ are not present in the anterior notopodia, and there are no neuropodial cirri. *E. oculata* has been placed by Professor Ehlers † as a synonym of *Oncoscolex dicranochætus* Schmarda, after he had examined the type-specimen of the latter.

Direct comparison of Dr Gravier's "*Eumenia oculata*" with the specimen collected in Scotia Bay, allowance being made for the disparity in size and age, shows that they belong to the same species. The chætæ of the two specimens exhibit an agreement in structure which is particularly striking, and prove that the specimens are specifically identical. There are only two slight differences between the specimens:—(1) the eyes of the Scotia Bay example are in contact, while those of Dr Gravier's specimen are separate, but a similar variation in the grade of development of the eyes is met with in different individuals of *Sclerocheilus minutus* (see p. 298); (2) the first neuropodial cirrus is borne on the 19th chætiferous segment in the Scotia Bay specimen, and on the 21st in Dr Gravier's, but a greater variation is met with in *S. minutus*, where the first neurocirrus may be borne by the 25th, 27th, 29th, or 31st chætiferous segment (see p. 301). A minute comparison of the two specimens shows that they are both examples of the same species, *S. antarcticus*, n. sp.

Text-fig. 4.—Bent chæta from the second notopodium of the specimen of "*Eumenia oculata*." (× 300.) (*Cf.* text-fig. 1, B, p. 295.)

* *Zool. Jahrb.*, Suppl. v (1901), p. 265. A fuller description of the specimen (collected at Tumbes, Chile) was given by Professor Ehlers in *Festschr. K. Ges. Wiss. Göttingen*, 1901, pp. 181, 182.

† *Abhandl. K. Ges. Wiss. Göttingen, Math.-Phys. Kl.*, N.F., Bd. iii, No. 1 (1904), p. 51; *National Antarctic Exped., Nat. Hist.*, vol. vi (1912), p. 26; *Deutsche Südpolar Exped.*, 1901-1903, Bd. xiii, Zool., v (1913), pp. 537, 538.

The only other Scalibregmid with stronger chætæ in the anterior notopodia which calls for mention here is that described by Dr AUGENER * under the name *Oncoscolex* (*Eumenia*) *heterochætus*, in which the first three notopodia bear stronger, bent chætæ. The description is not as complete as could have been desired, but it affords sufficient evidence—the segments are three-ringed, and neuropodial cirri and eyes are absent (or at any rate not mentioned)—to indicate that this worm is not, in spite of its stronger chætæ, a *Sclerocheilus*.

The foregoing considerations show that the genus *Sclerocheilus* is represented by only two valid species—*S. minutus* Grube and the new species, *S. antarcticus*, described in the present communication. The diagnosis of the genus *Sclerocheilus*, as given by GRUBE, and emended by SAINT-JOSEPH, requires some further emendation on the addition of the new species here described. The diagnosis † may be given as follows:—

Sclerocheilus ‡ Grube, 1863, emend. Ashworth.

GRUBE, *Arch. f. Naturg.*, Jahrg. xxix, Bd. i (1863), p. 50.
SAINT-JOSEPH, *Ann. Sci. Nat. Zool.*, sér. 7, tome xvii (1894), p. 103.

Abranchiate sub-fusiform Scalibregmidæ; the prostomium is drawn out into two blunt antero-lateral tentacular processes, and bears, dorsally, eyes which are either separate or are united to form a Λ-shaped pigmented area; the peristomium is a single achætous ring; the chætiferous segments (except the first two or three and a few of the most posterior) are subdivided into four annuli; the two rami of the parapodia are similar in form, and are simple oval elevations arising, in most of the segments, from a glandular raised area of the integument; stronger, bent chætæ are always present in the first notopodium (in *S. antarcticus* they are present also in the second and third notopodia), but not in the neuropodium; in the 3rd and all succeeding chætiferous segments each ramus of the parapodium bears slender capillary chætæ and, anterior to these, furcate chætæ; the segments of the posterior region possess conical or digitiform neuropodial cirri, and the anal segment or pygidium carries four or five (or six) digitiform anal cirri; a small lateral sense-organ (often recognisable only in thin sections) is present on each parapodium between the notopodium and neuropodium, but nearer the base of the former.

Type species, *S. minutus* Grube.

* *Bull. Mus. Comp. Zool. Harvard*, vol. xliii (1906), p. 159.

† The external features only are considered; there is not sufficient material of *S. antarcticus* to enable me to furnish a description of the internal organs, or to state if any of these may be employed as generic characters.

‡ σκληρός, hard; χεῖλος, lip. A name derived from the same roots, but spelt slightly differently—*Sclerochilus*—was employed soon afterwards by G. O. SARS to designate a new genus of Ostracods of the family Cytheridæ. See *Forhandl. Vidensk.-Selsk. Christiania* (1865), 1866, p. 89.

The two known species may be separated thus:—

1. Stronger chætæ present in first notopodium only; the segment which bears the first neuropodial cirrus varies from the 25th to the 31st . *S. minutus*, p. 307.

2. Stronger chætæ are present in the first, second, and third notopodia, but are not so proportionately stout as in *minutus*; the first neuropodial cirrus is present on the 18th to the 21st segment . . . . *S. antarcticus*, p. 309.

Sclerocheilus minutus Grube, 1863.

GRUBE, *Arch. f. Naturg.*, Jahrg. xxix, Bd. i (1863), p. 50; Taf. v, fig. 3 (Lussin piccolo, Crivizza, Neresine, all on Lussin Island, Adriatic).
GRUBE, *Die Insel Lussin und ihre Meeresfauna*, Breslau, 1864, p. 85 (Neresine, Crivizza, Cigale).
GRUBE, *Abhandl. Schles. Ges., Naturw. Abt.* (1868), 1869, pp. 105, 127 (Saint-Vaast).
GRUBE, 46 *Jahresber. Schles. Ges.* (1868), 1869, p. 67 (note on cirri).
ASHWORTH, *Quart. Journ. Micr. Sci.*, vol. xlv (1901), pp. 293, 297.
DEHORNE, A. et L., *Arch. Zool. Expér.*, tome liii (1913), p. 61 (Le Portel, near Boulogne).
M'INTOSH, *Ann. Mag. Nat. Hist.*, ser. 8, vol. i (1908), pp. 380, 381 (Guernsey, Herm).
Marine Biol. Assoc., *Journ. Mar. Biol. Assoc.*, N.S., vol. vii (1904), p. 231 (Plymouth).
MARION et BOBRETZKY, *Ann. Sci. Nat.*, sér. 6, tome ii (1875), p. 86 (Gulf of Marseilles).
MARION, *Ann. Sci. Nat. Zool.*, sér. 6, tome viii (1879), Art. No. 7, p. 5 (off Marseilles).
PRUVOT, *Arch. Zool. Expér.*, sér. 3, tome iii (1895), p. 643 (Banyuls); *op. cit.*, tome v (1897), p. 16, "Catal. des Invertébrés, etc." (Brittany; Gulf of Lyons).
SAINT-JOSEPH, *Ann. Sci. Nat. Zool.*, sér. 7, tome xvii (1894), p. 103 (Dinard and Saint-Malo); *op. cit.*, sér. 8, tome v (1898), p. 213 (Saint-Vaast); *op. cit.*, tome x (1899), p. 164 (Paimpol); *op. cit.*, sér. 9, tome iii (1906), pp. 147, 230 (Cannes).

A *Sclerocheilus* bearing in the first notopodium—(1) stout but straight, tapering chætæ; (2) very strong chætæ curved at their tips; (3) slender capillary chætæ. Stout chætæ are not present in any of the succeeding notopodia or in the neuropodia, the armature of which consists only of slender, capillary chætæ and furcate chætæ. Neuropodial cirri appear about the 27th segment (rarely anterior to this, and in some specimens not until the 31st segment), and are present in all the succeeding chætiferous segments (except in one or two of the last formed).

HISTORICAL ACCOUNT.—*S. minutus* was described by GRUBE from specimens collected by him on the shores of the island of Lussin, in the Adriatic. He, however, mistook the dorsal for the ventral surface. The generic name is based on another misconception, for the two dark plates described by GRUBE ("subtus ad os laminis 2 nigris corneis tricuspidibus armatus") as horny and on the ventral side of the head-lobe are the eyes which are situated on the dorsal side of the prostomium. The rest of the description and the figures are admirably clear, and the species was so well defined by GRUBE that subsequent workers have had no difficulty in recognising it when it came into their hands. GRUBE also, with his usual insight, recognised the close affinity of his new genus with *Scalibregma*.

The late Baron DE SAINT-JOSEPH revised and extended the description given by GRUBE, and added observations on some of the internal organs, *e.g.* the alimentary canal, nephridia, and reproductive organs. Quite recently M. and Mme. DEHORNE have given an account of the morphology of this species, dealing especially with the nervous system, eyes, and nephridia, with a discussion of the nature of the funnels of the latter. The other authors cited have either simply recorded the capture of specimens or have briefly referred to their external features. (For an account of the external features see pp. 298–302.)

BIONOMICS.—*S. minutus* lives in shallow water, and has been obtained either by shore-collecting between tide-marks or by dredging. The greatest depth from which it is recorded is 33–35 fathoms (at Cigale; GRUBE, 1864).

This worm has been frequently found between the lamellæ of old oyster-shells, and SAINT-JOSEPH suggested that the strong *chætæ* of the first segment served to excavate a shelter for the worm between the lamellæ. On emerging from its retreat *S. minutus* swims in the water by means of rapid wriggling movements, but soon falls to the bottom and lies on its dorsal surface with the anterior and posterior ends raised and the intervening portion curved. The worm probably feeds on mud and fine débris.

COLOUR.—*S. minutus* is usually reddish brown in colour, but may be a uniform dull brick-red (M'INTOSH). A female specimen full of eggs was greyish white (DEHORNE).

SIZE.—This species has not been found to exceed 20 mm., and most specimens are from 7 mm. to 15 mm. in length. The largest specimens seen by the writer are 18·5 mm. long; the smallest is one 2·2 mm. long, taken on the surface of the sea off Sark, and kindly lent to me by Professor M'INTOSH.

DISTRIBUTION.—I have examined specimens from most of the localities from which *S. minutus* has already been recorded—Lussin Island (Adriatic), Plymouth, Guernsey, Herm, Dinard, and Saint-Vaast.

Two additional localities may be given here. There are, in the Königliches Zoologisches Museum, Berlin, several specimens collected by GRUBE on the shores of Lesina, an island about one hundred and thirty miles south of Lussin. Through the kindness of Dr R. F. SCHARFF and Mr R. SOUTHERN, I have examined a collection of Scalibregmidæ from the west coast of Ireland, in which there are specimens of *S. minutus* from Blacksod Bay and Clew Bay, Co. Mayo. These are the first recorded Irish specimens, and they extend the area of distribution of the species north and west of its previously known range.

The range of distribution may be stated thus:—*S. minutus* occurs on the west coast of Ireland, in the English Channel,* along the south coast of France, and on the eastern coast of the Adriatic.

Type-specimens in Königliches Zoologisches Museum, Berlin.

* It will be observed that there is no record of the species from any point in the North Sea.

Sclerocheilus antarcticus, n. sp.

(Synonym : *Eumenia oculata* Gravier *nec* Ehlers.)

Eumenia oculata. Gravier, *Deuxième Expéd. Antarct. Franç.: Annélides Polychètes*, 1911, p. 112.

A *Sclerocheilus* bearing stronger, bent chaetae in the first, second, and third notopodia, but these are not so proportionately stout as in *S. minutus*. Stouter, bent chaetae are not present in the succeeding notopodia or in the neuropodia, the armature of which consists only of slender capillary chaetae and furcate chaetae. Neuropodial cirri are present on all the segments (except one or two of the last formed) from about the 18th or 21st.

Only two specimens are known. One, the type-specimen, 19 mm. long, dredged in 10 fathoms in Scotia Bay, South Orkneys (see p. 293); the other, the para-type, 11 mm. long, collected at low water on the east coast of Petermann Island, off Graham Land (see p. 303).

Type-specimen in Scottish Oceanographical Laboratory, Edinburgh.

Para-type in Muséum d'Histoire Naturelle, Paris.

Sclerocheilus caecus Saint-Joseph is a *nomen nudum* (see p. 303), and *S. pacificus* Moore is apparently not a *Sclerocheilus*, but should be referred to the genus *Oncoscolex* (see p. 304).

Addendum (*June* 21, 1915).—While this paper has been lying in type Mr Southern has recorded the specimens of *Sclerocheilus minutus* from Blacksod Bay and Clew Bay, mentioned on the opposite page, in *Proc. R. Irish Acad.*, vol. xxxi. *Clare Island Survey*, pt. xlvii (1914), p. 137. Prof. M'Intosh has given a general account of *S. minutus* in his *Monograph of British Annelids*, vol. iii, pt. i (1915), p. 42. Dr E. J. Allen, in a list of the Polychaeta of Plymouth (*Journ. Marine Biol. Assoc.*, N.S., vol. x (1915), p. 640), states that *S. minutus* was formerly frequently taken near Plymouth, but it has not been found during the last two or three years in spite of special search.

[*June* 22, 1915. *Note by General Secretary.*—The proofs of this paper and of the accompanying plate were passed by the author on June 1, 1914; but owing to the war and the unavoidable delay in obtaining delivery of the copies of the plate from abroad, the paper could not be sent to press until to-day.]

DESCRIPTION OF PLATE.

List of Reference Letters.

AN. C. Anal cirrus.
E. Eye.
MO. Mouth.
NEUR.[1] First neuropodium.
NEUR.[39] Thirty-ninth neuropodium.
NEUR. C. Neuropodial cirrus.
NOT. Notopodium.
NOT.[1] First notopodium.
NOT.[40] Fortieth notopodium.
NUC. O. Nuchal organ.
PER. Peristomium.
PR. Prostomium.
S.O. Lateral sense-organ.
TENT. Tentacular process of prostomium.

Fig. 1. *Sclerocheilus antarcticus*, n. sp. Type-specimen from Scotia Bay, South Orkneys. Dorsal aspect of prostomium, peristomium, and first four chætiferous segments. The prostomium is retracted into and partially hidden by the peristomium. For further description see pp. 293, 294. (× 25.)

Fig. 2. Ventral aspect of same specimen. (× 25.)

Fig. 3. *Sclerocheilus antarcticus*, n. sp. Para-type (= "*Eumenia oculata*" of Dr GRAVIER) from Petermann Island. Dorsal aspect of prostomium, peristomium, and first four chætiferous segments. Note the two everted nuchal organs. For further description see p. 304. (× 35.)

Fig. 4. Ventral aspect of same specimen. (× 35.)

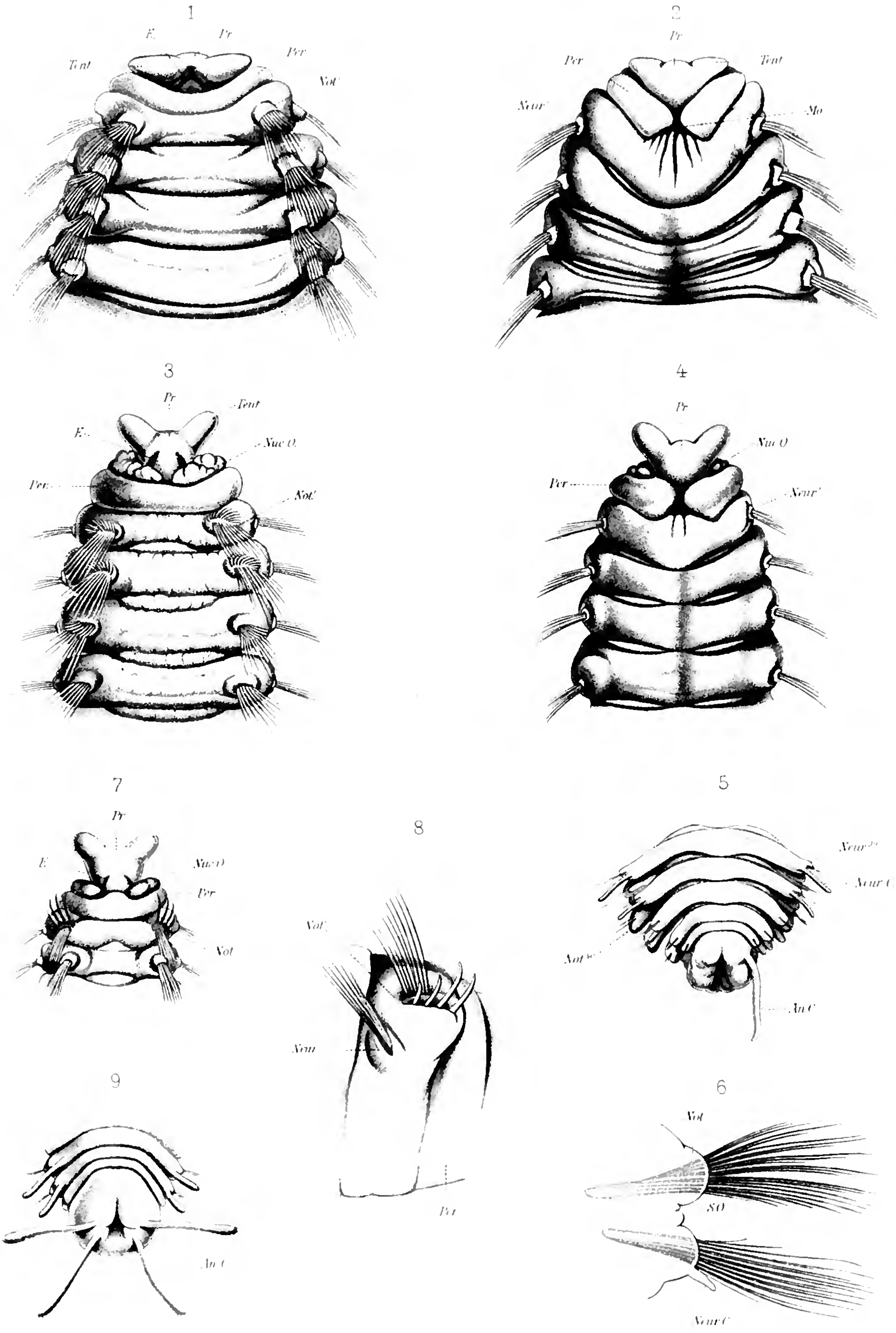
Fig. 5. *Sclerocheilus antarcticus*, n. sp. Type-specimen. Ventral aspect of the 39th–43rd chætiferous segments and the anal segment. Neuropodial cirri were probably originally present on the 41st and 42nd chætiferous segments, but have been lost therefrom. The anal cirri are also reduced in number, only one remaining. For further description see p. 294. (× 30.)

Fig. 6. *Sclerocheilus antarcticus*, n. sp. The 24th parapodium of the type-specimen, posterior aspect. Immediately ventral to the notopodium is the papilla bearing the lateral sense-organ; ventral to this is a much larger papilla the epidermis of which is glandular. For further description see pp. 294, 295. (× 30.)

Fig. 7. *Sclerocheilus minutus* Grube. Specimen 13·5 mm. long, from Plymouth. Dorsal aspect of prostomium, peristomium, and first two chætiferous segments. The right and left nuchal organs are everted. For further description see pp. 298, 299. (× 35.)

Fig. 8. *Sclerocheilus minutus* Grube. Specimen 18·5 mm. long, from Plymouth. Lateral (somewhat ventro-lateral) aspect of peristomium and first chætiferous segment. (× 40.)

Fig. 9. *Sclerocheilus minutus* Grube. Specimen 10 mm. long, from Saint-Vaast. Ventral aspect of posterior end, showing two chætiferous segments, another segment recently formed and as yet achætous, and the anal segment with four cirri. (× 80.)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PART XIII.

SPONGES (SUPPLEMENT).

XIII.—SPONGES COLLECTED BY THE "SCOTIA" IN THE ANTARCTIC. SUPPLEMENT.

By EMILE TOPSENT,
Professor of Zoology in the University of Dijon.

(*WITH FIVE TEXT-FIGURES.*)

Spongiaires recueillis par la "Scotia" dans l'Antarctique (1903–1904). Supplément.

Par **Emile Topsent**, Professeur à la Faculté des Sciences de Dijon. *Présenté par le* Dr. W. S. Bruce.

(MS. received June 1, 1915. Read June 28, 1915. Issued separately September 22, 1915.)

Depuis la publication de mon mémoire sur les *Spongiaires de l'Expédition antarctique nationale écossaise* (9), j'ai reçu de M. le Dr. W. S. Bruce quelques Éponges antarctiques faisant aussi partie des collections de la *Scotia* mais dont le triage s'était trouvé retardé.

Indépendamment de fragments en double d'espèces mentionnées dans mon mémoire, ce second lot contenait plusieurs formes qu'il me paraît utile de signaler ou de décrire.

Dendrilla arctica, Topsent.

Station 325, avril–août 1903 ; Scotia Bay, Orcades du Sud, 60° 43′ 42″ lat. S., 44° 38′ 33″ long. W. ; 9–10 brasses. Un rameau.

Cette Dendrocératide a été recueillie plus à l'ouest, aux Shetland du Sud et au-delà, dans les campagnes du *Français* (8, p. 11) et du *Pourquoi Pas?* Elle paraît être répandue dans la région américaine de l'Antarctique, au voisinage des terres et par des profondeurs médiocres.

Eumastia attenuata, n. sp. (Figs. 1 et 2.)

Janvier 1903, Port Stanley, îles Falkland, grève.

Un seul spécimen, incomplet, sans support, long de 7 centimètres, large de 3 centimètres en son milieu. Mince sur l'un de ses côtés qui, de contours doucement arrondis, représente son bord naturel intact, il est, sans compter les papilles, épais de 10 millimètres du côté opposé, qu'un instrument contondant a tranché nettement. L'outil a certainement laissé en place une partie plus ou moins étendue du corps, mais il a, pour ce qu'il en a détaché, suivi de très près le support. Le spécimen est donc un morceau d'une Éponge en plaque, à bords libres, et de quelque épaisseur en son milieu. Il revêt un aspect particulier parce qu'il soulève toute sa surface en processus digitiformes. Hautes de 5 à 9 mm., épaisses de 1·2 mm., en moyenne, ces papilles sont sensiblement cylindriques, droites ou un peu tordues ; généralement simples et indépendantes les unes des autres, elles deviennent souvent plus ou moins concrescentes par deux ou trois, tout en restant distinctes sur toute leur longueur ; quelques unes se divisent en deux branches. Leur nombre est tel que les intervalles qui les séparent restent étroits. Elles sont lisses, ainsi, d'ailleurs, que la surface générale à nu dans leurs intervalles. Aucune d'elles, de celles dont l'intégrité est

certaine, ne paraît percée d'un orifice à son extrémité ; toutes, au contraire, se montrent en ce point opaques et plus fortement teintées que le reste. L'absence de papilles ouvertes au sommet au moment où elle a été recueillie, n'empêche pas de considérer l'Éponge comme représentant une espèce du genre *Eumastia*. Outre que certaines des papilles peuvent avoir normalement joué le rôle d'oscules et se montrer contractées, il est évident que toutes ont fonctionné comme organes aquifères. Sous

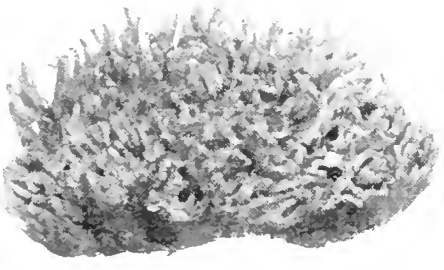

FIG. 1.—*Eumastia attenuata*, n. sp. $\times \frac{5}{6}$.

leur ectosome spiculeux, mince, transparent, rampe un système de canaux qui occupe la majeure partie de leur intérieur, le reste contenant un axe ramifié, irrégulier, de place en place relié aux parois par des brides ténues.

A part cela, comme chez *Eumastia sitiens*, la structure est celle des *Halichondria*, tant dans le choanosome que dans l'ectosome. Le choanosome est assez dense, quoique fragile ; l'ectosome se laisse détacher en lambeaux translucides. Le tout,

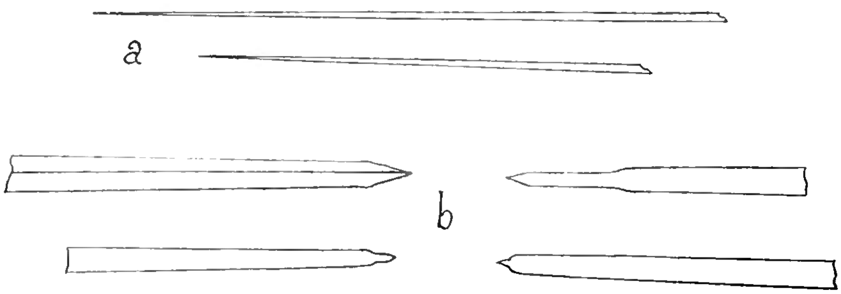

FIG. 2.—Extrémités des oxes de *Eumastia attenuata*. $\times 510$.

après un long séjour dans des alcools renouvelés, dont le dernier est incolore, a conservé une teinte orangée généralement pâle, assez vive pourtant, comme il a été dit, au bout des papilles. La coloration était due à un pigment diffus, car je note, en fait de cellules sphéruleuses, des éléments sphériques de 0·008 mm. à 0·012 mm. de diamètre, incolores, très brillants, composés de sphérules indistinctes avec un noyau central sombre.

Eumastia attenuata a pour spicules uniquement des oxes, courbés, fusiformes, inégaux ; les plus faibles mesurent 0·33 mm. de longueur sur 0·003 mm. d'épaisseur et les plus forts 0·48 mm. sur 0·01 mm. Les spicules grêles ont les bouts pro-

gressivement amincis en deux pointes fort longues et acérées (fig. 2, *a*); mais tous ceux, et c'est l'immense majorité, qui dépassent 0·004 mm. d'épaisseur, se terminent, au contraire, d'une façon singulière: un amincissement soudain leur forme une sorte de mucron (fig. 2, *b*) où l'on voit pénétrer le canal axial. C'est comme une atrophie dont tous se trouvent frappés aux deux bouts. En présence d'un spécimen unique, il est difficile d'affirmer que cette curieuse disposition ne résulte pas d'une aptitude toute individuelle. Toutefois, si ce caractère manquait de constance, la spiculation de *E. attenuata* se distinguerait encore de celle de *E. sitiens* Schmidt par les dimensions plus faibles de ses éléments et de celle de *E. Schmidti* Dendy (**1**, p. 240), par l'inégalité de leur taille.

Homœodictya microchela, n. sp.

Station 346, 1er décembre 1903: Banc de Burdwood, 54° 25′ lat. S., 57° 32′ long. W.; profondeur, 56 brasses.

Un spécimen blanc, dressé, simple, haut de 105 mm., épais de 10 mm. au plus, progressivement élargi depuis la base, qui mesure 7 mm. à peine, jusqu'au voisinage du sommet, où il atteint 30 mm. de largeur. Dépourvu d'axe compact, il est très flexible. Sa charpente interne consiste en un réseau lâche de fibres très riches en spongine, fort résistantes, épaisses et malgré tout incolores. Les fibres secondaires qui s'élèvent de ce système sont plus tenaces que dans la plupart des autres *Homœodictya*, la spongine les accompagnant jusqu'à leur terminaison. Il n'existe pas de membrane ectosomique distincte à la périphérie du corps. La surface, assez égale, a une hispidation nette, courte et serrée; ses orifices inhalants s'ouvrent au fond de dépressions sinueuses, plus ou moins profondes et plus ou moins rapprochées, qui la découpent en des sortes de villosités irrégulières. Les deux faces portent quelques oscules non surélevés, de 1 mm. à 2 mm. de diamètre; mais c'est surtout le long des bords du corps linguiforme que les orifices exhalants se localisent, disposés en série longitudinale, au nombre de 6 à 8 de chaque côté.

Les oxes, longs de 0·4 mm., épais de 0·013 mm., sont courbés, acérés, à pointes assez longues. Ils partagent ce dernier caractère avec les mégasclères de *Homœodictya kerguelenensis* Ridley et Dendy (**5**, p. 110) et se distinguent par cela même de ceux des Éponges de la *Discovery* appelées par Kirkpatrick *Desmacidon* (*H.*) *kerguelenensis* var. *antarctica* (**2**, p. 37) et qui, pour moi, représentent une espèce à part. Leur épaisseur est moindre que celle notée jusqu'ici des oxes de *H. kerguelenensis*, mais, comme on sait déjà que les dimensions de ceux-ci sont variables, on ne peut attacher d'importance à cette légère différence.

Ce qui, dans sa spiculation, distingue le mieux *Homœodictya microchela*, ce sont ses isochèles, de même type que ceux de *H. kerguelenensis*, mais bien plus faibles. Très abondants, ils n'ont que 0·017 mm. à 0·018 mm. de longueur, rarement 0·02 mm. Ils sont donc notablement plus courts que ceux même des spécimens de la collection

du *Français*. Ils sont, en outre, beaucoup plus minces que tous ceux que j'ai vus chez des *H. kerguelenensis* de provenances diverses. Leur tige, sans tubercules aux extrémités, dessine une courbe assez forte et assez régulière; leurs ailes ne s'aperçoivent presque pas de profil; enfin, leurs dents, aux replis généralement étroits, ont une courbure assez simple.

Esperiopsis Scotiæ, n. sp. (Figs. 3 et 4.)

Station 417, 18 mars 1904; 71° 22′ lat. S., 16° 34′ long. W.; profondeur, 1410 brasses.

Un spécimen. C'est, fixée sur un petit galet, une Éponge ficiforme, grise surtout sans doute à cause de la vase qui la souille. D'une base d'insertion étroite, dont elle est actuellement presque détachée, elle s'élève en un pied qui bientôt se renfle en un corps massif, comprimé. Vers le haut, un peu latéralement, s'ouvre un oscule unique, entouré d'un cône membrano-spiculeux translucide, assez haut. La partie renflée du corps est lisse, marquée de nombreuses dépressions circulaires ou ovales, petites et très peu profondes, pareilles à celles de beaucoup de *Grayella* et autres *Myxillinæ* et

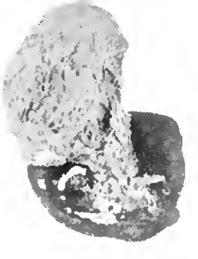

FIG. 3.—*Esperiopsis Scotiæ*, n. sp. × $\frac{5}{6}$.

représentant comme elles des aires inhalantes. Le pied s'est trouvé très endommagé, dépouillé de son revêtement et en partie effiloché. La hauteur totale de l'animal est de 37 mm., dont 10 mm. pour la longueur du pied. Celui-ci n'a guère que 5 à 6 mm. de diamètre. Le corps atteint 20 mm. de largeur, mais n'a pas plus de 5 à 8 mm. d'épaisseur. Sa consistance est assez élastique.

La portion dénudée du pied montre la structure du squelette interne. C'est, dans cette région tout au moins, un paquet de fibres ascendantes, polyspiculées, blanches, assez fortes mais sans spongine et, par suite, mal délimitées. Dans le corps, ces fibres se divisent en faisceaux spiculeux de plus en plus grêles à mesure qu'ils gagnent la périphérie, où ils se terminent juste au-dessous de l'ectosome. Comme d'habitude, les éléments de ces faisceaux centrifuges tournent leur pointe vers l'extérieur. L'ectosome est une membrane assez résistante quoique très mince, percée d'orifices microscopiques nombreux, et pourvue seulement de microsclères, mais en quantité considérable.

Spiculation.—I. Mégasclères : 1. *Subtylostyles* presque droits, un peu fusiformes ; base peu renflée, allongée, rarement marquée d'un bourrelet annulaire situé assez loin de son extrémité, suivie d'un cou peu rétréci mais assez long ; tige doucement polytylote, atteignant son maximum d'épaisseur en son milieu ; pointe brève, mucronée. Ils ont, pour la plupart, 0·9 mm. de longueur sur 0·012 mm. de largeur de base et 0·015 mm. d'épaisseur de tige, mais leur longueur peut osciller entre 0·75 mm. et 1·25 mm. et leur épaisseur entre 0·013 mm. et 0·02 mm.

II. Microsclères : 2. *Isochèles* arqués, extrêmement nombreux ; tige fortement

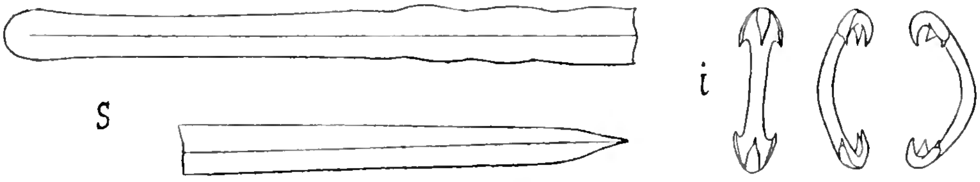

FIG. 1.—Spicules de *Esperiopsis Scotiæ*. *S*, extrémités d'un subtylostyle ; *i*, isochèles. ×510.

courbée, surtout dans sa partie médiane, à peine moins large qu'épaisse (0·0029 mm. de face pour 0·003 mm. de profil ou 0·0035 mm. pour 0·0038 mm.) et d'égales dimensions sur toute sa longueur ; dent courte, crochue, triangulaire de face avec tubercule large et pointe acérée ; ailes courtes, repliées en dehors, dentiformes. La longueur totale est de 0·04 mm. à 0·043 mm. ; l'écartement des ailes n'est guère que de 0·01 mm., leur longueur de 0·008 mm.

Suberites montiniger, Carter.

Station 346, 1^er^ décembre 1903 ; Banc de Burdwood, 54° 25′ lat. S., 57° 32′ long. W. ; 56 brasses.

Un seul spécimen, complet, sans la moindre trace d'attache à un support, par conséquent libre ; globuleux, avec un enfoncement, cependant, correspondant peut-être au côté par lequel il reposait sur le fond. Diamètre moyen, 16 mm. Coloration brunâtre à la surface, jaunâtre intérieurement. Consistance assez ferme. Surface lisse portant de très nombreuses papilles surbaissées, inégales et irrégulièrement distribuées. Les plus grandes, qui peuvent atteindre 1·2 mm. de diamètre, ont la forme d'un bourrelet circulaire en saillie autour d'une dépression centrale peu profonde ; les plus petites apparaissent comme de simples verrues minuscules sans perforation distincte. Il y en a partout, sauf sur la partie la plus bombée du corps, opposée à son enfoncement ; elles sont généralement dispersées ; les plus grandes, au nombre d'une vingtaine, sont cependant groupées d'un côté et séparées par des intervalles étroits ; la face concave en porte une quinzaine de petites.

Par ces papilles, l'Éponge doit avoir une certaine ressemblance avec *Suberites crelloides* Marenzeller (**4**, p. 4). Sa structure est la même ; les spicules, assez lâchement entrecroisés dans l'intérieur, forment à la surface une couche plus dense où

beaucoup se tiennent tangentiels tandis que d'autres se placent debout, la pointe vers le dehors. Le rapprochement est d'autant plus indiqué que les spicules ont, de part et d'autre, une forme rare chez les *Suberites*: ce sont des tylostyles à tête allongée. Ceux de *S. crelloides* atteignent, d'après les mesures des dessins qui en ont été publiés, 0·275 mm.; ceux de l'Éponge du Banc de Burdwood varient entre 0·32 mm. et 0·4 mm. de longueur sur 0·008 mm. d'épaisseur. Indépendamment de leur taille, il y aurait une différence de forme entre ces spicules, la tête de ceux du *S. crelloides* des parages de Jan Mayen n'atteignant que loin en arrière son maximum d'épaisseur. Pour le reste, il y a similitude remarquable, la tige étant souvent un peu onduleuse, se renflant doucement pour devenir aussi épaisse que la tête et se terminant en une pointe brève, mucronée. Le canal axial est visible jusque dans la tête des spicules de l'Éponge de la *Scotia* et s'y termine sans renflement vésiculaire.

Si je ne rapporte pas l'Éponge en question à l'espèce *S. crelloides*, c'est surtout à cause de la tête de ses spicules que je crois plus semblable à celle des tylostyles de *Suberites montiniger* Carter. Mais les dessins de Marenzeller et de Vosmaer concernant ces Éponges sont-ils d'une exactitude rigoureuse? Je ne suis pas absolument convaincu que *S. crelloides* diffère spécifiquement de *S. montiniger*. Marenzeller les a séparés en tenant compte avant tout de l'état de leur surface; mais il existait quand même des papilles chez *S. montiniger*, puisqu'il en est dit: "Vents, one large at the summit, fringed, the rest small, on the sides" (10, p. 31). Le nombre de ces éminences pourrait être plus élevé chez certains individus sans distinction spécifique possible.

J'ai vu, de l'Atlantique Nord, une Éponge que j'ai déterminée aussi *S. montiniger* (7, p. 130), qui n'a pas de papilles du tout et dont les spicules, par leur tête plus elliptique qu'ovale, ressemblent plus que tous les dessins à ceux du *Suberites* de la *Scotia*; ils sont de même grosseur qu'eux, mais plus courts et droits. Leur longueur (0·24 mm. à 0·295 mm.) est à peu près celle des tylostyles de *S. crelloides*.

Quant au *Suberites* de la côte occidentale de l'Amérique du Nord, appelé par Lambe (3, p. 128) *S. montiniger* Carter, il produit des tylostyles bien plus épais (0·016 mm.) que toutes les Éponges précitées et appartient peut-être à une espèce différente.

Latrunculia brevis, Ridley et Dendy. (Fig. 5.)

Station 346, 1er décembre 1903; Banc de Burdwood, 54° 25′ lat. S., 57° 32′ long. W.; 56 brasses.

Un spécimen assez grand, à papilles tout-à-fait semblables à celles du spécimen de *Latrunculia apicalis* Ridley et Dendy qui provient des Kerguelen (5, pl. xliv, fig. 4), mais à discasters constamment dépourvues de prolongement apical. Longues de 0·06 mm., ces discasters ressemblent beaucoup à celles de *L. brevis* Ridley et Dendy (5, pl. xliv, fig. 10): elles ont une base élargie, disciforme, à marge armée de fortes épines dirigées obliquement vers le bas; un verticille d'épines plus étroit la surmonte,

ordinairement régulier, assez écarté d'elle et nettement distinct, quelquefois diffus et plus ou moins confondu avec elle ; puis vient un verticille de 0·033 mm. de diamètre, le plus large de tous, bien perpendiculaire au grand axe du spicule, lamelleux, découpé par des incisures en trois lobes marqués en leur bord de plusieurs indentations ; puis encore un verticille semblable mais moins large et à lobes retroussés ; enfin, une couronne terminale composée de deux verticilles d'épines de plus en plus étroits, très rapprochés, emboités, l'inférieur fortement oblique vers le haut, le supérieur dressé. Sur les spicules imparfaits, cette extrémité se présente comme une dilatation ovoïde, simple ou déjà subdivisée par un léger bourrelet annulaire ; je ne l'ai vue qu'une seule fois, à cet état, surmontée d'une pointe apicale, longue et, naturellement, fort grêle.

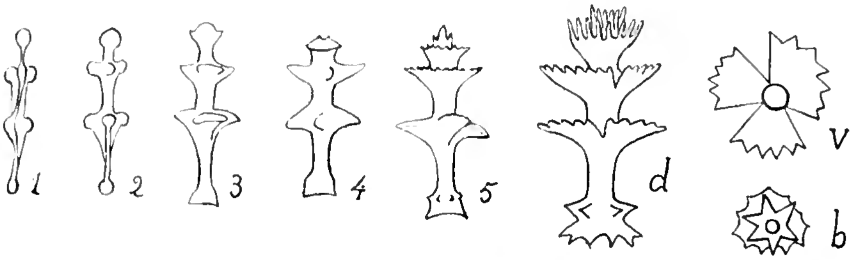

FIG. 5.—Discasters de *Latrunculia brevis*. ×540. 1–5, discasters imparfaites ; *d*, discaster parfaite ; *b*, sa base vue par dessous ; *v*, un grand verticille, de face.

Que cette exception devienne la règle chez certains individus et les discasters parfaites ressembleraient à celles de *Latrunculia apicalis*. C'est une possibilité que l'existence de *L. apicalis* var *biformis* Kirkpatrick (**2**, p. 14) rend admissible.

Les mégasclères sont des styles, legèrement polytylotes, souvent courbés ou flexueux, à pointe brève, à base simple, plus mince que la tige ; ils mesurent 0·5 mm. à 0·53 mm. de longueur sur 0·012 mm. environ d'épaisseur. Ils ressemblent, par conséquent, à la fois à ceux de *L. brevis* et à ceux de *L. apicalis*.

Il y a, en somme, quelques raisons d'admettre que ces deux espèces n'en forment qu'une seule, dont, par comparaison aux autres *Latrunculia*, *L. apicalis* ne serait pas la forme typique.

Caulophacus Scotiæ, Topsent.

Station 417, 18 mars 1904 ; 71° 22′ lat. S., 16° 34′ long. W. ; 1410 brasses. Un spécimen et un pédoncule détaché.

Le spécimen a le corps entier et le pédoncule brisé. Le corps, d'une très grande mollesse, est disciforme à contour sinueux et mesure près de 11 centimètres de diamètre ; épais de 4 à 5 mm. en son centre, il devient très mince sur les bords, qui se replient plus ou moins par dessous. La face supérieure (gastrique ou cloacale) n'est pas plane mais soulevée en une infinité de petites bosselures ; elle a son revêtement presque complet, formant sur ses orifices, inégaux, un tamis à mailles régulières. Le revêtement de la face inférieure (ou dermique) est moins bien conservé ; ses

déchirures laissent à nu deux sortes d'orifices, les uns grands mais de diamètre d'autant plus large qu'ils sont voisins du centre, les autres petits, distribués entre les premiers. Le pédoncule, cylindrique, épais de 9 mm., s'attache au milieu de la face inférieure ; il est creux, mais sa cavité n'aboutit pas à un orifice externe ; elle communique avec les lacunes creusées dans l'épaisseur du corps. Il n'en existe plus qu'un tronçon, long de 6 centimètres seulement, de calibre uniforme, assez souple et, au moins par places, finement hispide.

Par sa forme comme par ses dimensions, ce spécimen ressemble beaucoup plus au type de *Caulophacus latus* F. E. Schulze (6, p. 124, pl. xxiv) qu'à celui de *C. Scotiæ* Topsent (9, pl. ii, figs. 1–3). Pourtant, certains traits de sa spiculation sont caractéristiques de *C. Scotiæ*. Ses hexactines dermiques, quoique de dimensions un peu plus faibles que dans le spécimen géant primitivement décrit, ont toujours l'actine distale renflée en pinule notablement plus courte que les autres actines, même que la proximale, qui est toujours bien plus brève que les tangentielles. Ses autogastralia sont, au contraire des autodermalia, de taille fort inégale ; ce caractère, déjà noté d'après le spécimen type de *C. Scotiæ*, est en opposition avec ce que montre la reconstitution, d'après Schulze, d'une coupe verticale de *C. latus*. Les discohexasters, à rayons secondaires de même longueur que les primaires, portent des boutons terminaux petits et sans denticules distincts.

D'autre part, certains traits de la spiculation sont communs à celle du type de *C. latus*. Ainsi, il existe, parsemées dans le revêtement dermique, des hexactines à actine distale barbelée longue, que je n'ai point trouvées dans les portions examinées du type de *C. Scotiæ*. Puis, les autogastralia sont ici un mélange d'hexactines et de pentactines, avec prédominance de ces dernières. Enfin, les microsclères, de deux sortes seulement, sont d'une grande uniformité.

Les parties hispides du pédoncule doivent leur aspect à un revêtement composé de spicules pareils aux autogastralia, encore plus inégaux qu'eux de taille et presque toujours à l'état de pentactines, leur actine proximale se réduisant à un tubercule. Sa cavité longitudinale a une paroi lisse, sans spicules de revêtement et limitée simplement par un feutrage, sans synapticules, de diactines de longueur et de grosseur variables.

Le pédoncule détaché, provenant de la même station, est cylindrique, long de 13 centimètres, un peu moins gros que celui de l'Éponge précédente et solide. Il porte par places encore un peu de son revêtement sous forme de pentactines à actine distale longue et barbelée, de dimensions très inégales.

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